SCIENCE
GOSSIP.

HARDWICKE'S

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FOR 1874.

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Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY J. E. TAYLOR, F.L.S., F.G.S., &c.,

AUTHOR OF "GEOLOGY OF MANCHESTER AND THE NEIGHBOURHOOD," "SKETCH OF THE GEOLOGY OF SUFFOLK," "GEOLOGICAL STORIES," "HALF-HOURS AT THE SEASIDE," "HALF-HOURS IN THE GREEN LANES," ETC.

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PREFACE.

CUSTOM has rendered it an imperative rule that every volume shall have a "Preface." A magazine must submit to the same ordeal as its more pretentious brethren, whenever it collects its twelve scattered numbers into one. But the practice gives the Editor this advantage—once in a year he can address his readers and contributors *ex cathedrâ!* He can cry *peccavi* to the complaints that may be raised, or smile with satisfaction at the compliments proffered. He can give friendly hints to those to whom they may be useful, and not less effective reproofs where these may be needed. He can draw the bond of union which unites people of all ages and in every position in life, but possessing kindred tastes, more closely together; and feel that he is addressing them, not as "readers" and "contributors" only, but as "friends."

One feature in the past year's numbers our readers may have noticed — we have endeavoured to give, under their respective headings, abstracts of the most important papers read before scientific societies. This is of great importance, as enabling those who love natural history, but have little means or leisure to go deeply into it, to obtain an intelligent knowledge of what is going on in the great world of Science.

Our "Correspondents" column is that which always lays us under obligation to our scientific brethren, whose willingness to help is best known to those who test it most. For ourselves, as well as for our querists, we return them our sincere thanks for the kindnesses shown during the past year. Whilst we are referring to this subject, it might be as well to suggest that nearly one-half of our questioners would save us much trouble, and inform themselves much better, if they endeavoured first to obtain the information themselves. In many cases, the simplest manual of natural history, such as few cottage shelves are now without, would amply supply the knowledge sought for. Nor is a hint here out of place as to the manner in which the objects sent for identification are packed. *Match-boxes* seem to be the favourite vehicles of transit, and we should like nothing better than that those who adopt these otherwise useful packing-cases, should see the postal litter in which they are frequently delivered!

Natural Science is extending its borders, and increasing in the range and boldness of its speculations. Only a few, however, are privileged to stand on its mountain peaks, and view the land that is afar off! But it is surely not too ambitious a hope to entertain that the facts collected and recorded in such magazines as SCIENCE-GOSSIP afford some additional data out of which the great scientific superstructure is being built.

With kindly feelings of gratitude and friendship we dedicate this volume to our readers, and wish them individually

"A HAPPY NEW YEAR!"

LIST OF ILLUSTRATIONS.

NOTES ON THE ENTOMOLOGICAL SEASON OF 1873.

THE season of 1873 has been declared to have been one of the worst for many years, owing, probably, to the fact that the heavy rains in the preceding autumn destroyed multitudes of pupæ, and late frosts in the spring as many larvæ. But even in this season, which has earned for itself such a bad name, there are several records of the capture of very rare insects, and other notices of insects less rare having been taken in localities where they had not previously been known to occur; such, for instance, as northern insects having extended their southward range, and other cases which will presently be mentioned.

First and foremost amongst the captures recorded in this journal, and in the *Entomologist*, we find twenty-five notices of the occurrence of *V. Antiopa* (Camberwell Beauty), distributed over several of our English counties, and including two captures in Scotland.

In point of numbers the neighbourhood of London stands highest, recording four specimens; viz., one at Hampstead, one at Stamford-hill, one at Clapham, and one in London itself, at Finsbury.

The northern counties furnish us with five captures: one in Cumberland, one in Lincolnshire, one in Yorkshire, and two in Lancashire. In the eastern counties we have four specimens recorded; viz., Norfolk one, Suffolk one, and Essex two; while ten are reported (exclusive of the four captures near London) from the southern and midland counties; viz., Berks two, Worcestershire one, Surrey three, Sussex two, and Kent two.

The Scotch specimens were taken in Aberdeenshire, on the banks of the Dee.

As was also the case in 1872, there are no records of any captures of *V. Antiopa* in Ireland during the past season. Besides the number of recorded captures, it is probable that some have been taken of which no notice has been sent to the entomological magazines, so that I think we may conclude that at least thirty have been seen and captured last year, several of which were hybernated specimens of the previous season.

This number is considerably less than the "take" of 1872; but the disparity is probably owing to the fact that almost all the individuals seen in that year were netted, so that few were left to perpetuate the species.

The only other very rare butterflies caught in 1873, whose capture is recorded, are one specimen *A. niobe* (by some regarded as a variety of *adippe*), and one *M. dia*, an insect so rare that hitherto it has only obtained a place in our list of "reputed" British species.

Turning to the *Nocturni*, we find recorded two captures of that very rare sphinx *C. celerio*, one at Southport and the other at Bolton.

H. velleda (Northern Swift) has been extending its southward range; it has been reported from the Quantock Hills, Somerset, from Folkestone, and I have heard of its capture in Norfolk.

Amongst the *Noctuæ* there are several rarities that have been taken during the past season, of which the following may be noticed.

P. leucophæa—several specimens captured near Canterbury.

X. conspicillaris, of which one specimen was taken at Danbury.

L. albipuncta — two captured at Folkestone, where it has previously been taken.

P. alpina—a pupa found by Mr. Allin near Braemar, at a great elevation, produced this rare species.

C. gnaphalii, both in the larva and imago state, has again been taken at Darenth Wood.

C. absynthii—one capture is recorded from Ireland, where it had previously been unknown; the larvæ have also been taken near Sevenoaks.

A. ophiogramma—one taken in Ireland, where it is exceedingly rare.

O. lunaris—a specimen of this insect was taken near Lewes.

The *Pyrales* furnish us with one very rare species, *A. nemoralis*, which has turned up in two or three localities; viz., at Willesden, Lewes, and in Surrey.

"Sugaring" has been condemned as an utter failure during the season of 1873, and yet almost all the rare *Noctuæ* mentioned above were taken at "sugar."

The uncertain appearance of such species as *C. edusa* and *hyale*, and of *C. cardui*, &c., has been repeatedly noticed, but the subject of the occurrence of rarities when common insects are scarce, is one which, in spite of the attention paid to it, has not yet met with a satisfactory explanation. M. H.

HISTORY OF THE DIATOMACEÆ.

PROFESSOR H. L. SMITH, in the August (1873) part of the *Lens*, commences a translation of Kützing's "Historical Preface" (*Geschichtliche Einleitung*) to his "Bacillarien"; and as this preface is of considerable interest to the student of the Diatomaceæ, we propose to give a short *résumé* of Professor Smith's translation. The translator remarks in a note, that the introduction of Kützing's "Bacillariæ" (*Bacillarien*) presents so many points of interest for the student, and is so valuable as an historical summary, that I propose, in the intervals between the appearance of the different parts of my own synopsis, to give a somewhat free, though accurate, translation of it:—"Already, for four thousand years [*Jahrtausend*, *lit.* 'thousands of years.'—F. K.] has the mind of man searched the wonder works (*Wunderwerken*) of creation, yet (still) a vast field remained unexplored, closely connected with the numerous forms of that endless nature which the unaided eye had recognized, and the higher probing mind had arranged, when in the commencement of the 17th century, a compound microscope was invented by Zacharias Janson and his son, in Middelburg; and with that man ventured upon the unknown, and till then invisible, field of smallest organisms, the discovery of which opened an entirely new world in miniature.

Although it is uncertain what particular forms of the Diatom group the first observers found and endeavoured to represent by description and picture, yet it may be taken for granted, with great certainty, that they must have met with isolated specimens, since they are so widely distributed. For the first discovery of forms which we are able to identify with any certainty we have to thank O. F. Müller, who, in 1773, described and figured a *Gomphonema*, under the name of *Vorticella pyraria*, and a *Fragilaria* as *Conferva pectinalis*, and a *Melosira* as *C. armillaris*. A much greater sensation was produced by the discovery of the staff animalcules (*Vibrio paxillifer*) by Müller, and which the discoverer did not know where to classify, but later embodied in the genus Vibrio.

Gmelin, in the 13th edit. of Linné's "Systema Naturæ," corrected this error, and founded a special genus upon this form, and to which he gave the name Bacillaria, and from this the whole group received the name Bacillariæ, or staff animalcules.

The lower Algæ had, at the end of the last century, very zealous friends (*sehr eifrige Freunde*) in Germany, in Mertens Trentpohl, Roth, Weber, and Mohr; in England, Dillwyn; and in France in Girod-Chantrans and Draparnaud; and several forms now distributed among the genera Fragilaria, Melosira, Diatoma, Tabellaria, and Schizonema, were described by these naturalists as *Confervæ*.

In the beginning of the present century some good figures of *Conferva stipitata* (=*Achnanthes longipes*); *C. obliquata* (=*Isthmia enervis*); *C. Biddulphia* (=*Biddulphia pulchella*), were given.

Although De Candolle, so far as is known, made no special study of these organisms, he was the first to separate the form previously known as *Conferva flocculosa*, as a special genus, which he called Diatoma. Agardh adopted this genus in his "Synopsis Algarum," 1817, but combined with it other species—*D. Swartzii*, *D. pectinalis*, *D. fasciolatum*, which are now distributed among as many different genera.

We are indebted to Nitzsch for the most important investigations made by him in the same year. He furnished in his little work, long since out of print, "Contributions to the Knowledge of Infusoria, or a Natural History of the Zerkariæ and the Bacillariæ," with six coloured copperplates, the first really good pictorial representations. He also first recognized the prismatic shape of these forms; he correctly observed and explained the separation into zig-zag chains and the production of ribbon-like forms from an imperfect separation (incomplete self-division). In 1819 appeared Lyngbye's *Tentamen Hydrophytologiæ Danicæ*; this work contained more Bacillarian forms than any previous publication. Twenty-five different forms were distributed among the genera Diatoma, Fragilaria, and Echinella. The name of this last genus had been previously given by Acharius, and incorporated for several years in the systematic handbooks, and had even been given by me in my "Decades of Fresh-water Algæ," to a form which, in the following year (1835), was recognized as insect eggs.

In 1820, Link described two new genera, *Lisigonium* (not *Lisogorium*) =*Melosira* and *Hydrolinum* =*Schizonema*.

In 1822, Bory de St. Vincent treated on some of the Bacillariæ, and described and figured *Echinella stipitata* as *Achnanthes stipitata*, but placed in this genus forms not belonging to it. The genus *Fragilaria*, Lyngbye, he described as *Nematoplata*. In the article *Bacillariées* (in the "Dictionnaire Classique d'Histoire Nat."), he constituted the genus *Navicula*, and in the article *Confervées*, which appeared in 1823, he described the genus Gallionella.

In 1824, C. A. Agardh published his "Systema Algarum," and describes the Bacillariæ as a special order of Algæ, under the name of Diatomeæ, and arranged them in a better and more thorough manner than his predecessors; he placed them in the genera :—1. *Achnanthes ;* 2. *Frustulia ;* 3. *Meridion ;* 4. *Diatoma ;* 5. *Fragilaria ;* 6. *Melosira* (=Gallionella, Bory); 7. *Desmidium* (now excluded); 8. *Schizonema ;* 9. *Gomphonema.*

Having thus brought down our *résumé* to this date, we hope in future numbers to glance at the history of these forms up to the time of the publication of Kützing's work (in 1844). Those who wish to read the entire translation will find it in the *Lens*, Nos. 2 and 4, vol. ii. F. K.

THE STORY OF MY ROBIN.

ONE morning about the end of May, I saw my little dog in a great state of excitement in the garden. She was tossing what looked like a small ball up into the air, then pouncing on it as it came down. I went out to see what it was, and found a poor little frightened Robin at that moment actually in her mouth. I took it from her, and carried it into the house, expecting to find it torn and bitten; but not even a feather was ruffled, and the poor little fellow only appeared faint with fright, opening and shutting his eyes alternately, and trembling violently. He soon revived, and began to kick and scream; so seeing there was not anything really the matter, I made him eat some bread and milk, the only food at hand fit for him. He rebelled against being fed for about a day; and then, apparently thinking it was not so bad after all, he submitted patiently, and in a week began to peck about and feed himself, and even attempted to sing, in his small way, early in the morning. After keeping him in a cage for about a month, I turned him loose in a room. He was at this time rather a gawky, speckled little fellow, with long yellow legs. About the beginning of July he began to moult, and by the end of August he was a beautiful Cock Robin, with a lovely red waistcoat and pretty black legs and feet.

Very soon after his transformation, he began to sing, partly his own natural Robin's song mixed with some notes of a canary, and some whistling learned from his mistress. At last, I heard, one morning, a very gentle, shy, "Pitchee (pretty) Bobby." He very soon gained courage, and called it out loudly, adding, by degrees, "Sweet Bobbee," and "Pretty little fellow." The latter, being his last accomplishment, is not quite so distinct, as yet.

He sings and dances on the floor, and appears most amiable and charming; but if any one (even his own mistress) puts her hand within his reach, he perches on it, pecking, and biting and pinching, like a spiteful child. He has, I believe, caused the death of several canaries kept in his room. He has been seen spitefully to twitch out a feather from a tail, when he could reach it through the wires of a cage; and one morning I found nearly all the tail-feathers of a goldfinch, mixed with sundry pins, nails, and buttons, collected in a small heap. Since this discovery, he has had his wing clipped, and so is kept on the floor beneath the cages.

His temper is peculiar, and he is easily offended. If I presume to keep him in a cage for a longer time than he approves, when I again let him out he will run away and hide himself, and refuse to sing or speak for some hours. On one occasion, I took him to another house, intending him to show off his accomplishments. He behaved like a wild bird, refused to be caught, and remained at the top of the room, on a curtain-pole. He was only at last driven into his cage by hunger, when the door was rapidly shut upon him. On his return to his home, though at once set at liberty in his own room, he refused to speak, sing, or take any notice of his mistress for nearly a fortnight.—*K. H.*

The above statement is communicated to me by "K. H." I have witnessed the gambols, and heard the words mentioned most distinctly pronounced by the Robin, in a whistle rather than in the manner that parrots talk. I have also noticed another matter which seems to indicate that birds can communicate by language. The Robin was left in another room, which contained a window looking out into the garden, and, whilst there, was visited by two or three Robins, who flew violently against the glass, as if trying to liberate him from his confinement. On each occasion after these interviews, the little prisoner refused to be petted, remained silent and frightened, as if ideas had been communicated to him by his outside friends which rendered him unhappy and disconsolate. Whatever communication took place was through the glass, and would indicate the possession by birds of an audible language. ALFRED CARPENTER.

Croydon.

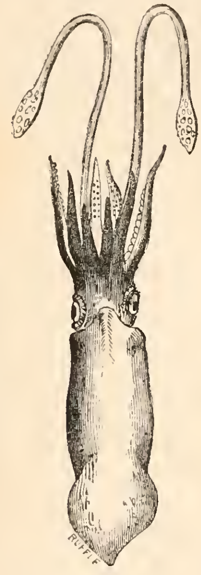
"A knowledge of science attained by mere reading, though infinitely better than ignorance, is knowledge of a very different kind from that which arises from contact with fact."—*Huxley's Physiology.*

CHAPTERS ON CUTTLES.

No. 2.

By W. H. Booth.

IN geological times the *Tetrabranchiata* were the more abundant forms, as testified by the numerous species of ammonites, orthoceratites, and others, whilst the *Dibranchiata* were comparatively scarce, and very poorly represented. Proceeding, we find that the two-gilled are separated into two sections, A and B, the first of which (A) contains cuttles which have eight arms, and is hence termed *Octopoda;* whilst the latter section contains cuttles which, in addition to the eight arms, possess two long tentacles, and so the section goes by the name *Decapoda*. The first in order of the eight-footed cuttles is the Paper Nautilus, *Argonauta* (so called from the ship *Argo*, and ναυτίλος, the Greek for a sailor), a species which is not represented in British waters. From the times of the ancients the Paper



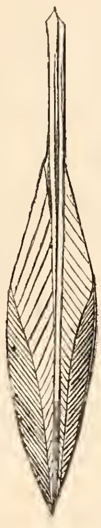


Fig. 1. Common Squid. (*Soligo vulgaris.*) Fig. 2. Pen of ditto.

Nautilus has been a subject of conjecture and romance. Pliny and Aristotle both mentioned it in their works, and failed not to weave a most fanciful story concerning it. They supposed that two broad arms, with which the animal is equipped, were used for sails, and other arms for oars, so that the Argonauta navigated its vessel like any skilful seaman. Even two of our own poets have fallen into the same error; Pope's lines,—

> "Learn of the little nautilus to sail,
> Spread the thin oar, and catch the driving gale,"—

are perhaps the best known; but James Montgomery gives us some verses to the same effect in his "Pelican Island." They are really very prettily rendered, and, were the deeds they chronicle true, would be doubly so. Unfortunately, however, the highly poetical idea of the animal's hoisting up its sails, and scudding before the breeze, is not true; but observers say that it does occasionally make use of its other feet as oars or paddles. The female

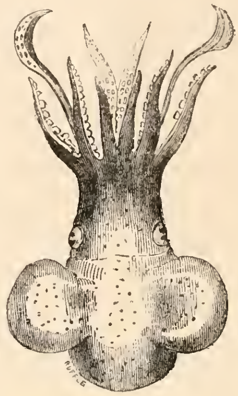


Fig. 3. *Sepiola atlantica.* Fig. 4. Pen of ditto.

only is provided with the shell we so much admire, and the function of the two broad dorsal arms, which were supposed to be used as sails, is in constructing this. The shell is of a description different from that of the Chamber Nautilus, not being partitioned off into separate divisions, and also, the animal is not fastened to it by any muscular attachment, but can leave and resume it at pleasure.

Fig. 5. Horny jaws, or mandibles, of Cuttle-fish.

People very naturally thought from this that the shell was not the production of the animal they found in it, but that it had been formed by some other creature, and seized as a convenient dwelling-place by the cuttle. Madame Jeanette Power, residing at Messina, conducted several experiments to test the truth of this, her conclusion being that the shell was the veritable production of the Argonauta. Having collected a number of living specimens of *Argonauta Argo*, the Mediterranean species of Paper Nautilus, this lady broke their shells in different degrees, and was rewarded by seeing some apply their broad dorsal arms to the fractures, and deposit a thin film of shelly matter, covering the broken parts. In about thirteen days, this became quite as hard and thick as the unbroken part, but slightly more opaque. Should the whole of the shell be broken, the animal is unable to reconstruct a new one, and dies. The eggs are kept within the shell, and are so clustered around the spiral, that when the animal propels itself, keel foremost, they are not exposed to the swift current of water, which otherwise might seriously interfere with their due incubation. The shell, during the life of the animal,

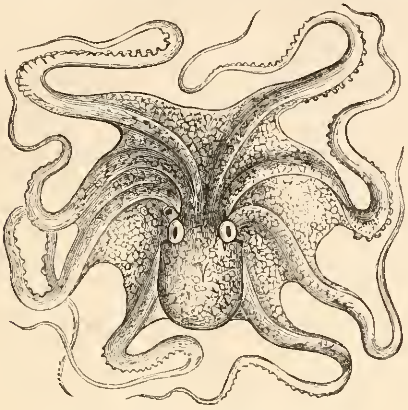


Fig. 6. Cuttle-fish. (*Octopus vulgaris.*)

is flexible, and with a little pressure can be squeezed together. When dry it becomes quite brittle, but after being soaked in water for some time may be bent as before. The males, not possessing any shell, naturally do not require the means of making one; and so we find that in the male Argonauta

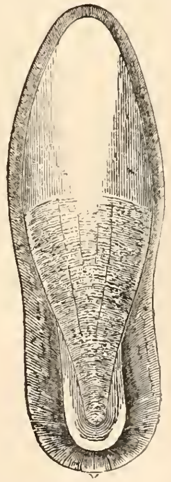


Fig. 7. Bone of common Sepia. (*Sepia officinalis.*)

the dorsal arms are not expanded into a fleshy disc, as those of the female. The males, and also the females when denuded of their shells, have very much the appearance of the common Octopus, with which they are nearly connected. Their usual mode of progression is that of other cuttles, namely, by the expulsion of the water from the gills; they also crawl along the bottom of the sea. The Argonauta is very abundant about Messina, and even enters the port. It is most plentiful about autumn, and frequents muddy spots. Madame Power was inclined to believe that the Argonauta really did use its two dorsal arms as sails, but another close observer of these interesting creatures, M. Sander Rang, at Algiers, altogether discountenances the idea. He says,—"Watching what took place around the Poulp (another name for Cuttle), which we left contracted in the Argonaut shell, we saw it extending itself from its shell and protruding six of its arms; then it threw itself into violent motion, and travelled over the basin in all directions, often dashing itself against the side. In these different movements the body leaned a little

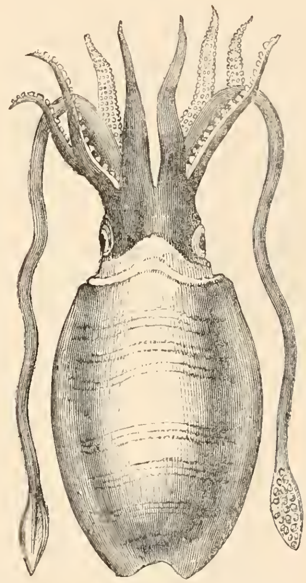


Fig. 8. Common Sepia. (*Sepia officinalis.*)

towards the forepart of the shell, aud the long slender arms, much extended and collected into a close bundle, were carried before it, as well as the tube, which showed itself open and protruded. The locomotion was effected in the ordinary manner of Poulps, backwards, by contraction of the sac, and expulsion of water through the funnel." Another species of Paper Nautilus, *Argonauta hians*, is found on the west coast of Africa and in the Chinese seas; but although it has been discovered in a fossil state in Piedmont, no living species have been taken in the Mediterranean. *Argonauta Argo* attains the largest size of all the Paper Nautili, the shell sometimes exceeding nine inches in diameter; most specimens of other species would average about three inches.

The next cuttle which we shall examine is the *Octopus* (ὀκτώ, *octo*, eight, and πούς, *pous*, a foot), or Poulp. Many are the names that have been given to this species,—Sucker, Man-sucker, Blood-sucker, and Devil-fish, being amongst them. A species of this genus was the celebrated Polypus of the ancients, performing all sorts of wonders and terrible deeds. As I now sit, there are three of our English Poulpes, *Octopus vulgaris*, staring at me with their huge dark eyes, and in their present condition looking inexpressibly ugly. These three creatures I procured a few months ago, and in order to be able to examine their organization more closely, had them immersed in spirits of wine, and securely corked up. As our English Octopus is as good a representative of its kind as any, we will take it as our example. Many are the little adventures I have had with the Octopus. By going out to its haunts, several opportunities of seeing it in its many different conditions have been offered to me. For a general appearance of the animal I must refer my readers to the illustration, merely observing that when in the following lines any mention is made of "ventral or dorsal" sides or feet, by "dorsal" is meant the side on which the funnel is situated; and by "ventral" the opposite. As its name implies, the Octopus has eight fleshy arms or feet, which on an average are about twice the length of the body, are very muscular and flexible, and taper down to a point little thicker than ordinary twine. Along the whole under-surface of these arms is situated a series of circular discs or suckers, of strange construction. These suckers are fixed in pairs, except the first half-dozen near the mouth, which are placed immediately over each other; they form the chief means by which the Poulp is enabled to seize its prey, and are of curious construction. To describe them, I cannot do better than liken them to the pneumatic pegs so largely used by photographers, and for fastening on to shop-windows. Like these pegs, the suckers have around the outside a broad soft band, which in the case of the pegs is made of india-rubber, and in that of the Octopus of a fleshy substance. This band then leaves a cavity in the centre, and to this hollow is attached a muscular piston, exactly fitting the aperture, capable of being worked up and down at the will of the animal. When, therefore, the surface of this sucker is pressed against any substance, the withdrawal of the piston creates a vacuum, and powerful adhesion takes place. Having seized its victim by encircling it with his arms, the Octopus drags the unfortunate animal to the powerful horny mandibles with which it is furnished, and makes short work of it. These mandibles are similar to the beak of a parrot, and are of great strength, being able to break through the hard shelly covering of crabs or lobsters. Endued with so much strength, the Octopus makes its jaws very effective weapons, such that a close acquaintance with them when the animal is alive is far from desirable. A Mr. Beale has described an encounter he had with an Octopus in the Bonin Islands, where he was searching for shells. It seems that Mr. Beale, seeing one of these strange-looking monsters on the rocks, endeavoured to stop its progress by pressing on one of its legs with his foot. As the animal still persisted in its attempts to escape, he caught hold of one of its arms, and tried to disengage it from the rocks, when the animal, evidently enraged, loosing its hold from the stones, sprang on his arm, and prepared to bite it with its beak. Had not a friend been at hand, the consequences might have been serious; but, fortunately, a companion came up, and released Mr. Beale from his ferocious assailant by means of a large boat-knife. Thus we see, the Octopus when enraged does not hesitate to attack man himself, in self-defence. The number of suckers possessed by our common Octopus falls but little short of two thousand; their application to the human skin is said to cause pain and inflammation. My own experience has not led me to verify this statement; for, although in searching under the rocks, in such places as the Octopus loves to haunt, I have often had my hand seized by its tenacious arms, yet on releasing myself, no subsequent feeling of pain whatsoever has resulted. The cold, slimy grasp of this small creature is by no means pleasant; how much more so must that of the larger species be? The food of this cuttle consists chiefly of mollusks, which it collects and brings to its den. The fact of the Poulp having a regular den is rather curious, as one would have supposed that an animal so low in creation, and of such a predatory nature, would devour its prey on the spot. The place chosen for the den is generally an isolated piece of rock, situated on the sand, where the hollow which is generally to be found round about such stones, forms a convenient place for the Octopus to stow itself, and deposit its booty. The large otter-shells (*Lutraria*), with those of the genus *Tapes*, and various others, form its favourite food. Often after bringing the creature out of its den, a feat best performed by means of a large fish-hook attached to a stick, many excellent shells, with the animals still undevoured, may be found. An amusing fact is that the Octopus nearly always has a number of hangers-on, in the shape of small Hermit Crabs (*Pagurus*), mostly tenants of a common top-shell (*Trochus cinereus*). These parasitical hosts, on being disturbed, present a most ridiculous spectacle in their hurry to be off. Endeavouring to clamber up the bank of sand, they naturally only bring down a heap of it with themselves, and to see twenty or more of these droll little creatures rushing franctically up, and then falling back again pell-mell, is most laughable. As the Octopus is addicted to getting more food than it can possibly stow away in its capacious stomach, these small gentry act as its scavengers, and clear away the remains of each feast in the neatest manner. The skin of the Poulp is furnished with several colour-glands, which enable the animal to vary its tint in a manner very similar to that of the Chameleon. In a chase after one which I had disturbed, I was pleased to notice that when darting over sandy ground, its colour became very much lighter than before, whilst directly it approached a rocky or shingly portion of the coast, a darker hue pervaded its body. Darwin, in that most interesting of books, his "Journal of a Voyage Round the World," gives a pleasing account of the Octopi at St. Iago. After a description of their rapid motion, and methods of escaping notice, he goes on to say that any part of the skin of the Octopus, on being subjected to a slight shock of galvanism, becomes quite black: a similar effect, but in a less degree, is produced by scratching the skin with a needle. These clouds, or blushes, as they may be called, are said to be produced by the alternate expansion and contraction of minute vesicles containing variously-coloured fluids. This gentleman whilst looking for marine animals, with his head near the rocks, was more than once saluted by a jet of water, accompanied by a slight grating noise. On examination, he found out that this was a cuttle which, though concealed in a hole, thus led to its discovery. "That it possesses the power of ejecting water," says Darwin, "there is no doubt, and it appeared to me that it could certainly take good aim by directing the tube or siphon on the under part of its body." As the Octopus darts along, the dilation and subsequent contraction of the sac is very plain, and the rush of the water through the funnel is also easily discernible. Its first action on being disturbed is to discharge some of the ink with which it is furnished, in order to cover its retreat. This ink is of a more viscid nature than ordinary writing ink, and when spurted forth does not become generally suffused, but forms a dense cloud about the animal, and ultimately settles down to the ground. Even if all its supply of ink has been discharged, the Octopus in a few hours has a full battery ready for use again. The flesh of the Octopus is sometimes used as food, but only by the poorer classes of the seaside population. In the Levant, (according to "A. M. B.," SCIENCE-GOSSIP, June, 1865), a species of Octopus, going by the name of *Octopoda*, is very troublesome to the fishermen, but much esteemed as an article of consumption. The method of preparing it for table in those Eastern quarters, is to beat it for an hour or so against a rock, and afterwards serve it up as a fricassée, or otherwise. Horrible to think of, some savages eat the Octopus raw—what a strange taste is this! In the *Octopoda*, no shell, internal or external, is visible; they are said to be highly luminous in the dark, and Pliny, quoting Bartholinus, says so great was the luminosity proceeding from them '*ut totum palatium ardere videretur*.' There are upwards of forty species of Octopus known; their eggs are usually deposited in the spring on sea-weeds or empty shells.

We now come to Section B, the Ten-footed Cuttles, or *Decapoda*. The chief peculiarity of the animals comprised in this section consists in their having, in addition to the eight arms such as are possessed by the Octopus, two long tentacles, whose ends are expanded and furnished with suckers. These tentacles, in all but one genus, can be drawn within a sort of pouch situated below the eyes; they are of use to the cuttles for seizing their prey, and also for mooring the animals fast to the rocks, when the stormy weather would threaten them with destruction. The suckers of cuttles of this section are of a different description to those before mentioned, being what is termed pedunculated, and more prominent. The dissimilarity chiefly consists in their being surrounded by a horny ring. Their bodies are rather elongated, and contain a shell which in some species is calcareous, and in others horny; it is not fastened to the body of the animal, but contained loosely in the mantle. The Decapods are mostly gregarious, and frequent the high seas in great numbers, moving about periodically from the northern and southern zones. They are divided into four families, the *Teuthidæ*, *Belemnitidæ*, *Sepiadæ*, and *Spiralidæ*, a few genera of each of which we shall examine in their order. Our first decapod, a member of the *Teuthidæ*, or Calamaries, is a very abundant animal on our coasts. Reference to the illustration of the Squid (*Loligo vulgaris*), for that is the creature's name, will show that in this species the arms are very short, and the body much elongated. An expansion of the mantle on each side of the caudal extremity forms a pair of fins, by means of which the Squid is able to swim very swiftly. The most curious part of the animal is its shell, or pen, as it is called, a horny substance analogous to the bone in the Sepia. This pen may be seen figured, together with the illustration of the animal; it resembles an ordinary quillpen in general shape, and acts as a sort of backbone to the creature. Several "pens" have been found in the body of a single squid, so that it is thought that they increase with the age of the animal. From possessing this peculiar appendage, the Squid has had the name of Sea-pen given to it. The pen is of a horny transparent substance, and has been found in a fossil state. Like most other cuttles, the Squid is furnished with a supply of ink. From these two characteristics, I think it might very appropriately be called the "Pen-and-Ink Cuttle." A lady at Lyme Regis, Miss Mary Anning, was the first to discover the ink-bags of the Loligo in a fossil state in that neighbourhood. They are found distended just as when they formed parts of the living animal and retain the same juxta-position to a horny pen, which the ink-bag of the recent Loligo bears to the pen within the body of that animal. The state of preservation of the pens is such as to admit of a close comparison of their internal structure with that of the present living Loligo. Similar remains of the pens and ink-bags of animals of this genus are frequently found in the Lias shale of Aalen and Boll, in Germany. The Squid is the animal used for bait in the Newfoundland cod-fisheries, and is also occasionally used for the same purpose by the fishermen on our own coasts. The manner in which it is caught is as follows:—A party of sailors go out in boats to a place the Squid is known to frequent, armed with an instrument know as a "Squid-jigger." This consists of a number of large hooks fastened together so as to form a circular *chevaux de frise*. To catch the Squid, this weapon is fastened to a line, and dropped in the water without any bait, but by giving it a continuous up-and-down motion, all the Squids that come near are hooked and secured. On being brought to the surface, they discharge a torrent of ink, so that to avoid being deluged with the black stream, a little dexterity is needed. The Loligo has sets of suckers arranged in two rows along its arms, as the Octopus; the suckers on the extremities of the tentacles are situated in fours. This is a well-distributed genus, being found in the Atlantic, Mediterranean, North Seas, and the Southern Ocean. Of another genus, *Sepiola*, an abundant little species is found in our common Sepiola (*Sepiola atlantica*). In this cuttle the body is short and dumpy, furnished with two comparatively large-sized fins situated diametrically opposite one another on the sides of the animal. The pen is very similar to that of the Loligo. Gosse, in his valuable work on the aquarium, gives a vivid description of this animal, portraying in the most lively terms the various evolutions it is seen to perform when kept captive in an aquarium. A striking feature in the animal is the propensity it has for burrowing; by directing its funnel towards the sand, and then expelling the water from its gills, it scoops out, in the most perfect manner, a small hollow, where it snugly ensconces itself, leaving but little of its body visible.

Passing over several other genera, we come to the *Onychoteuthis* (ὄνυξ, *onyx*, a claw, and τευθὶς, *teuthis*, a calamary) or uncinated calamary. This formidable genus, in addition to the suckers on its arms, is furnished with a terrible set of horny hooks on the expanded extremities of its long tentacles. By means of these hooks it is better able to retain its hold on fishes, as, from the slimy nature of their scales, it would frequently be difficult to get the suckers into action. As if not sufficiently armed with its suckers and hooks, this calamary is also furnished with an adhesive disc, immediately below the hooks on the tentacles; and by bringing these two discs together they become firmly locked. The victim once embraced by these has no hope of escape left, and is pressed against the jaws of its destroyer by means of the arms. The next genus, *Enoploteuthis* (ἔνοπλος, *enoplos*, armed, and τευθὶς), is a still more formidable one, for in it *all* the arms are furnished with hooks. Professor Owen says that the natives of the Polynesian Islands live in great dread of cuttles of this genus. One species found dead there by Sir Joseph Banks, measured over six feet in length. One arm of this identical calamary is still preserved in the museum of the College of Surgeons, where it may be inspected. Another genus, *Ommastrephes* (ὄμμα, *omma*, the eye, and στρέφω, *strepho*, to turn), much resembles the Octopus in general form. The eyes are very conspicuous, and the arms welded together up a considerable part. Animals of this genus, as well as those of Loligo, are used in the cod-fisheries. The former have the power of leaping a great height out of the water. Mr. F. D. Bennet mentions that these calamaries were very numerous in the vicinity of the Sandwich Islands, where they are extensively used as food, their flesh having somewhat the flavour of a lobster, and being considered a delicacy. In that locality the Flying-fish and this Calamary were most plentiful during a calm, when they were seen leaping out of the water. The fate of the Ommastrephes appears to be somewhat similar to that of the Flying-fish; for whilst leaping out of the water to escape their aquatic pursuers, they fall a prey to birds, who diligently watch for an opportunity to seize them when out of their native element. Some few, being thus pursued, leapt up to a considerable height above the bulwarks of the ship in which Mr. Bennet was, and fell on the deck. Having now examined a few of the genera of the *Teuthidæ*, we proceed to the next family, the *Belemnitidæ*. This family is probably better known to our geological than to our conchological friends, as no living species exists, and all our information as to it is drawn from fossils. The shell of the Belemnites, which is nearly the only part ever found, was an internal one, somewhat similar to that of the Sepia. In the middle is a sort of cup, termed the alveolus, divided into compartments, which are connected by a tube. The alveolus is protected by a calcareous incrustation (rostrum), rather elongated, whose function was probably to guard the animal from the shocks to which it was exposed as it swam backwards. It is this rostrum which is discovered so very frequently in a fossil state. An interesting article on the Belemnites, by our much-esteemed editor, will be found in the volume of this magazine for 1872. It is embellished with several illustrations, which will serve to make their construction more manifest.

Leaving the *Belemnitidæ*, we now proceed to the *Sepiadæ*. The Sepia (*Sepia vulgaris*) may be said to be the commonest of our English cuttles. It is somewhat similar in appearance to the common Loligo, but larger and altogether more robust, and has a fin running down both its sides. Though the animal itself is but rarely seen on our coasts, except after a storm, yet the bone or shell with which it is furnished may be picked up in profusion nearly anywhere. This bone, sometimes called sepiostaire, is for the most part constructed of pure chalk. It is loosely contained under the mantle, on the dorsal side, the apex being situated near the end of the body. The bone seems to be curiously analogous to the backbone of vertebrates, and forms a sort of link between them and the *invertebrata*. Besides being of use to strengthen the Sepia's body, it is also serviceable in acting as a float to buoy the animal up. On examination through the microscope, it will be found to consist of shelly plates, kept a slight distance apart by a series of innumerable small pillars. Viewed through the microscope, either as an opaque object or with polarized light, the effect is very pleasing. One surface is quite hard, while the other is so soft that a deep impression may be made with the nail. The largest-sized sepiostaire I have met with measures rather over seven inches in length and three in breadth. From its being of such a light substance, and formed into air-chambers, it is peculiarly fitted to enable the Sepia to float on the surface of the water without any muscular exertion, and so is a most indispensable adjunct to the animal; for, unlike the Octopus, the Sepia does not crawl along the bottom of the sea, but swims on the surface, disporting itself amidst a crowd of its fellows. In places on the sea-coast, the cuttle-bone is often given to canaries and other cage-birds, who seem to take a delight in drilling their beaks into the soft, chalky substance. It is also used as a dentifrice, and may frequently be purchased at perfumers' shops for that purpose. Forbes says that about the shores of the Eastern Mediterranean the common Sepia is so numerous that the "cuttle-bones" may be seen in places heaped up by the waves into a ridge which fringes the sea for miles. Other peculiar belongings of the Sepia are its eggs, which may be found on the shore sometimes, after stormy weather. The eggs are strangely like a bunch of purple grapes, both in shape and colour; they are connected in bunches by a sort of footstalk. The ink from this species is of a more intense colour than that from other cuttles. From it was originally manufactured Indian ink, and the colour so largely patronized by Claude,—sepia. This ink has been found preserved in the fossil sepias, when none of its qualities were lost. A drawing of a fossil species, together with a description of it, was made out of the ink found therein; and a celebrated painter, on trying some of the ink, and not being aware of its origin, asked where he could procure some more of so excellent a pigment. It is strange that this ink should lose none of its properties after the lapse of so many thousand years. The eyes of the Sepia are prominent, and, when taken from the living creature, of a pearly tint. In some parts of the South of Europe they are strung together when dry and hard, and worn as necklaces. The Sepia is very voracious, and as its food consists chiefly of fish and such crustaceans as crabs and lobsters, it is more especially an object of hatred to fishermen. It seems remarkable that an animal with so exposed a body should be able to overpower the hard-shelled crabs or lobsters; but such is the case, for the Cuttle makes use of its arms and tentacles to tie up the claws of the victim, and then proceeds to tear open the shell with its strong, horny jaws. Sepias are especially fond of visiting the nets which have been laid for fish, and, coming, as they generally do, in great swarms, devour the greater part of their contents. A friend tells me that at Seacombe, in Devonshire, last August, the fishermen, thinking a shoal of fish was in the bay, put out their nets, and were greatly disgusted to find them filled with cuttles instead of fish. Two hauls were thus taken; the number caught exceeding 400.

(*To be continued.*)

THE GOLDEN MINNOW.

(*Hybognathus osmerinus*, Cope.)

BY CHARLES C. ABBOTT, M.D.

WE never pass by a group of urchins fishing, but we examine their "strings," and, at a penny a piece, cut off the few golden minnows they may have hooked; and to be honest about it, when

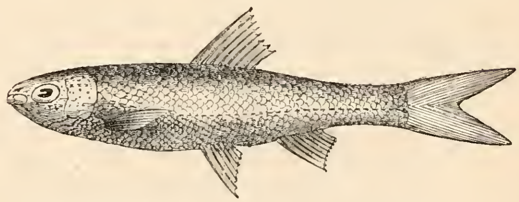


Fig. 9. Golden Minnow. (*Hybognathus osmerinus.*)

children of a larger growth have been catching pickerel bait, in the way of cyprinoids generally, which they wouldn't sell, why the writer has "hooked" the golden minnows from the mass of roach, shiners, and dace. We admit a weakness for preserving them from such common uses; they seem to be all our own, for if Prof. Cope is right, we first detected their peculiarities, and submitting the fish to him, he named it. Then we only knew it as "as a new species"; but now, as the months have rolled by, we have learned something concerning it. Curiously enough, our collecting experience shows it to be most abundant in the Delaware and Raritan Canal. With abundance of natural watercourse all about it, it nevertheless is best pleased with the artificial stream, the tame, even banks of the canal, that have just grass enough about them to shelter such small fishes. We once left the realms of science and wondered if the fact of their own alimentary "canal" being five times the length of their whole body, and so a prominent feature of their anatomy, made them prefer a canal to live in, on the principle of "a fellow feeling, &c. &c."; but enough of this and more of the zoology proper.

Popularly, *i. e.* with juvenile anglers, this pretty fish is known as the "Golden Minnow," and it is a very correct description of the fish's general appearance when living. The back and sides to the lateral line are dull golden-yellow, while down the back, on a line with the insertion of the dorsal fin, is a very beautifully bright line of polished gold. When taken from the water, these metallic tints are too noticeable to be overlooked, even by boys intent only on capturing a "big string"; and they show to great advantage in an aquarium.

A lover of deeper waters than cyprinoids usually prefer, they appear to be rare, judged only by the few that wander into the shallows and seek the company of the "red" and "silver fins." To find them abundantly they must be sought in waters of considerable depth, and resting on or very near the bottom, close to the shore generally, in patches of grass; but the shore must be a steep bank, with the current moving at a fair rate, keeping the water clear and cool.

If, while fishing for other kinds, we chance to drop the hook near them, they pounce upon it; and thus is explained the fact that these little fish are often caught by anglers who are after eels, catfish, and such larger kinds as frequent the bottoms of the streams. Just what particular kinds of food they prefer, we could never determine; but, judging from the length of the intestine, it must be something slow in digesting; and this brings up the question, was the bowel made thus so very long for the food, or did the food cause, by its presence, the lengthening of the bowel? Cyprinoids generally have an alimentary canal of ordinary length; all our New Jersey species have, except this golden minnow, and we incline to the belief that a predilection for some peculiar article of diet has lengthened, folded, and refolded this canal, until its present length suited the time required to take up the nourishment of the favourite food. Rather this than extra intestine was given to this one species, that it might live on something not suitable to a short-bowelled species. The known food of the Gizzard-shad (*Dorosoma cepedianum*) explains the strong muscular stomach possessed by that fish; and the voracious appetite of the "Pirate" (*Aphredodirus sayanus*) may have much to do indirectly with the eight or nine cæca attached to the alimentary canal of that fish; but so far the golden minnow's diet is not sufficiently known to explain why so enormously long a digestive tract is a necessity.

Speaking of cyprinoids generally, Prof. Cope remarks,* "Differences of habit are associated with peculiarities of food and of the structure of the digestive system. Few families of vertebrates embrace as great a variety in these respects as the present one. There are carnivorous, insectivorous, and granivorous genera, which are distinguished as among mammalia, the former by the abbreviation, the last by the elongation of the alimentary canal; in the former the teeth are usually sharp-edged or hooked, in the latter truncate, hammer or spoon-shaped." Guided by this, we should be led to believe that the *Hybognathus*, with its alimentary canal five † times the length of the body, fed exclusively upon vegetable matter, but we do know that this is not the case; nor is our common roach ‡ a vegetable-feeder, in th strict sense of that term, as stated by many writers. We have generally found the whole length of the intestine filled either with mollusca entire, or, as the bowel nears the vent, with the emptied shells; the juices of the stomach and bowel having dissolved out the body of the animal. The Golden Minnow is an exception to the law (?) governing the regulation of diet with regard to the length of the alimentary canal.

Like the majority of our cyprinoids, this little fish becomes brighter in all his tints, and more active in all his movements, in the early spring; and the silvery sides putting on a ruddy tint, that in contrast with the permanent but now brighter golden, make our little pet second to none in general attractiveness.

Prof. Cope has given this species, as we have seen, the specific name of *osmerinus*, which refers to the fact of the specimens first submitted were found in company with the Frost-fish, or Smelt (*Osmerus mordax*), that ascend our rivers in immense numbers in February. The Golden Minnow does not, however, remain with them long, or follow them again to the sea. Indeed we think the association is occasional and accidental, rather than a habit of the species.

Trenton, New Jersey, U.S.A.

RAINBOWS.—Some years ago I remember having seen three distinct rainbows. Of these two were concentric, but the other one intersected them. Will any of your numerous readers kindly explain the cause of the phenomenon?—*Theophilus Bates.*

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* Cyprinidæ of Pennsylvania ("Trans. Amer. Philos. Soc.," vol. XIII. p. 353).

† Prof. Cope gives the length as *four* times, but it is fully *five* times in the *Hybog. osmerinus*.

‡ *Stilbe americana*, Linné.

NEW BOOKS.*

SCIENTIFIC readers of all classes cannot complain for want of intellectual pabulum. It is both varied and abundant, served up in all kinds of dishes, and garnished with all sorts of attractive surroundings. Nor can the most captious complain of the weak nature of the material supplied. In this respect it is unequalled in the history of literature.

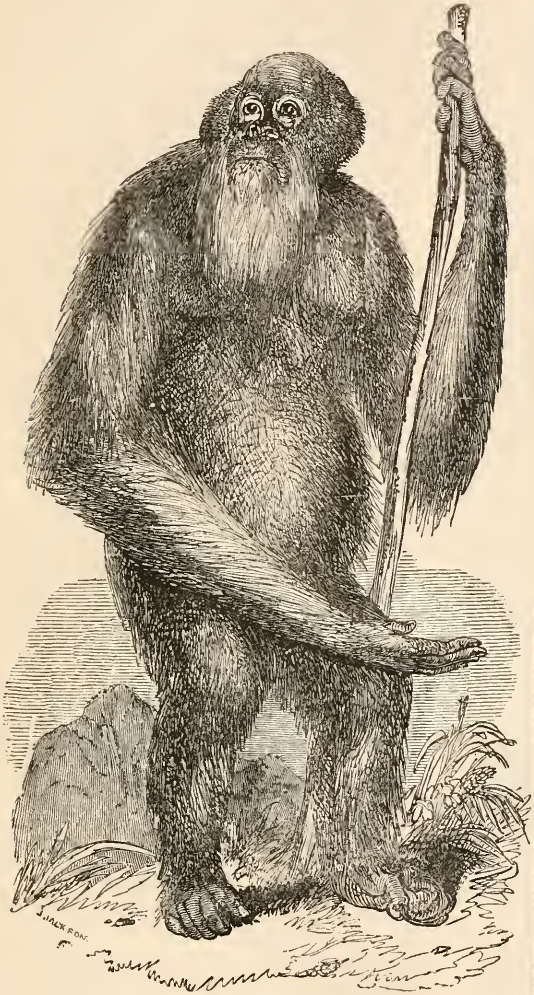


Fig. 10. Adult Male Orang.

Dr. Ross, whose work we have placed at the head of our list, modestly states in his preface his indebtedness to the great leaders of modern science, and seems to put forth his volume rather too tentatively. We assure him he need not be ashamed of his production. It is a valuable evidence of the not distant *utilitarian* application of the theory of evolution. Dr. Ross has proved sufficiently that what many regard as nothing but airy speculations, chiefly fruitful in their waste of time, may result in a more thorough knowledge of zymotic diseases, and therefore lead to the alleviation and possible extinction

Fig. 11. Face of Proboscis Monkey.

of the direst diseases to which poor humanity is liable. In this essay the author has quoted freely from the most distinguished of modern writers, so that, in this respect alone, the student will find it a valuable digest of opinions on the subject discussed. Dr. Ross is opposed to the theory that contagium particles are parasites in the zoological or botanical sense. On the contrary, he holds that contagium particles are living, in the sense of being portions detached from a living being: that they are not germs capable of giving origin either to higher forms of life, or to organisms like themselves, but that they are anatomical units modified and individualized by a diseased process, and capable of impressing upon the healthy organism with which they come into contact a succession of changes similar to that which preceded their own modification in the body from which they were detached. In short, the Doctor has applied Darwin's hypothesis of "Pangenesis" (which he shows is as old as Hippocrates) to the explanation of the phenomena of zymotic diseases. The last chapter, which deals with the probable mode in which zymotic diseases have been differentiated, is both valuable and

* "The Graft Theory of Disease." By James Ross, M.D. London: Churchill.

"Mind and Body." By Alexander Bain, LL.D. London: Henry S. King & Co.

"On the Conservation of Energy." By Professor Balfour Stewart. London: H. S. King & Co.

"Man and Apes." By St. George Mivart, F.R.S. London: Hardwicke.

"The Smaller British Birds." By H. G. and H. B. Adams. London: George Bell & Sons.

"Waste Products and Undeveloped Substances." By P. L. Simmonds. London: Hardwicke.

"Where There's a Will There's a Way, or Science in the Cottage." By James Cash. London: Hardwicke.

"The Telegraphic Journal." Vol. 1. London: Henry Gillman.

highly interesting. The author contends that contagium particles will differ in properties according to the kind of epithelial structure from which they originally descended. These correspond to the three great tracts into which the tissues may be divided—the skin, the respiratory, and the digestive mucous membranes; and therefore we have the three groups of zymotic diseases—epidemic, pulmonary, and intestinal. The clear and spirited style in which this book is written is a great advantage to the reader, to whom we can conscientiously recommend it as a genuiue treat.

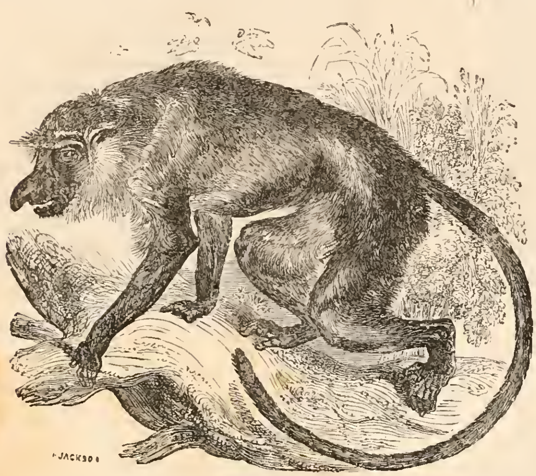


Fig. 12. Proboscis Monkey.

Fig. 13. Chameck Spider Monkey.

It was indeed "a happy thought" to conceive the idea of giving to the world a complete library of scientific books on every department of modern science, each to be written by the most distinguished writers ou the several subjects, English and foreign. This "Internatioual Series," as they are fitly termed, is now in due course of publication. The two volumes on our list are good examples of the nature of these productions. They are handsomely and attractively got up, so as to make one's library look a trifle more cheerful than hitherto. Who could better write on the physiological and psychological relations of mind and body than Professor Bain? Or at whose hands could we expect a more thorough and exhaustive knowledge of the "Conservation of Energy" than from those of Balfour Stewart, the popular Professor of Owen's College, Mauchester? These works possess the rare value of being strictly popular and strictly scientific, and indicate that such a combination is not impossible. The limits of space forbid us to do more than to bring this series before the notice of our readers with our strongest recommendations.

Those who read Mr. Mivart's articles in the pages of the *Popular Science Review*, on "Man aud Apes," will be pleased to see them appear in the handsome volume form in which the publisher has uow issued them. The articles have been considerably eularged, and fully illustrated. Mr. Mivart, as the author of that charming work, the "Genesis of Species," will always obtain a hearing, not ouly from scieutific men proper, but also from those who do not profess to be scientific, and yet who are deeply interested in the leading theories aud discussions of the day. The preseut volume is especially valuable to studeuts as containing by far the fullest and completest comparison of man with the Quadrumana that has yet appeared. It has been the custom to compare the human frame with what was considered the highest member of the ape family, but Mr. Mivart clearly shows the fallacy of such a method. Of all the monkey tribe, the Gorilla is believed to be that most nearly approaching man in its structural peculiarities—to be, iu short, the veritable "missing liuk." Although Mr. Mivart seems inclined to grant the generally high zoological position of the Gorilla, he argues that the nearest approaches in structural peculiarities to man's frame are not to be found in any particular species, but are scattered throughout the entire series of Quadrumana, not even excepting the half-apes. After devotiug some space to the zoological position of the Gorilla, the author proceeds to notice the various degrees of resemblance to man which the different kinds of apes exhibit. The Chimpanzee is universally acknowledged to be "anthropoid," especially in its juvenile condition. It and the Gorilla represent the highest apes of Western Africa, just as the Orang is the highest quadrumanous representative in Borneo and Sumatra. The figures of the latter we have borrowed from Mr. Mivart's book give a good idea of the generally more human likeness seen in the younger stages of the anthropoid apes. This is seen again in the face of the baby "Moor monkey" (fig. 16). Of all the monkey family that which approaches man most nearly in the conformation of its nasal organ, is the "Proboscis Monkey," a native of Borneo. In the attenuated form of the limbs, the monkeys furthest removed from humanity appear to be the "Chameck Spider Monkeys," whose prehensile tails and slender legs show how truly they are adapted, not to a ground, but to a terrestrial life. Mr. Mivart compares every part of the human frame with that of the monkeys in general, and finds some point of near resemblance in one or another of this numerous group, but never all the points in any one member. Nay, some of the species, as the Orang, for instance, diverges more from man, as regards its skeleton, than does any other latisternal ape. The author concludes that the teaching of the skeleton, as well as of all the other parts, seems to be that resemblance to man is shared in different and very unequal degrees by different species of quadrumana, rather than that any one kind is plainly more human than any of the others. In cerebral development, the Gorilla is inferior both to the Orang and the Chimpanzee; the difference between the brain of the Orang and that of man being one of degree, and not of kind. On the other hand, the author shows that the difference between the *mind* of man and the psychical faculties of the Orang is a difference *in kind*, and not one of mere degree! These facts, the author believes, militate against the supposition that man has been derived from the monkey family by the Darwinian process of "natural selection," but he does not think they are antagonistic to a belief in man's origin by the larger and more comprehensive process of evolution. The latter part of the book is devoted to this question, and there the reader will find able arguments for considering this fact of man's physical peculiarities being shared among so many members of the Quadrumana, advanced in favour of the doctrine of evolution as applied to the human race.

"The Smaller British Birds" is an *édition de luxe*, got up in the most attractive style of green and

Fig. 14. Young Orangs.

Fig. 15. The Chimpanzee.

gold, and gilt edges, and having an interior worthy of the exterior as regards artistic effect. Our "Smaller British Birds" in point of fact comprehend nineteen-twentieths of all our avian fauna, and as each is figured in bright colours (a trifle too bright, perhaps), our readers may form some idea of the pictorial wealth of this book. The eggs of each species are also figured and naturally coloured, and we must bestow a word of praise on the really artistic manner with which the delicate tints, and shades, and markings are all given. As each is of the natural size, this part of the book cannot but be of great value to the student. The plan of figuring both birds and eggs is a good one. The letter-press is clear, and the paper good, whilst the authors have collected a good deal of sound information, and have arranged it in a very distinct manner. By using

Fig. 16. Moor Monkey.

this book, the young ornithologist will save much time, and gain his end more speedily than from any other similar work that we are acquainted with.

One cannot peruse Mr. Simmonds's book without feeling how truly we are wasting our substance in riotous living! Here is a work of above five hundred pages devoted to showing how materials may be utilized that we are in the habit of regarding not only as utterly useless, but many of them as deleterious. If "dirt is matter in the wrong place," then "waste" is profitable substances in the wrong place. No man in Great Britain is better able to deal with the important question of "Waste Products and Undeveloped Substances," than Mr. P. L. Simmonds; no other writer has devoted so much time and attention, or has for so long been regarded as an authority on these and kindred matters. If we had to find any fault with this most interesting, and what we regard as an *important* volume, it is that the vast store of material is not arranged under chapters or sections. We feel that such an arrangement would materially add to the value of the work. In a great measure, however, this is atoned for by a copious index. To the general as well as to the scientific reader, to the statesman and manufacturer especially, this book is invaluable. A word should be said as to its literary style. It is easy and attractive, and notwithstanding the overcrowding of facts, interests the reader instead of wearying him.

Mr. Cash's handsome little volume is just the book one would put into the hands of an unfledged naturalist. We know none other better able to speedily develop him. And to older readers it possesses many attractions, in setting before the world the simple but earnest lives of humble workers in the field of science. Here we learn how such "hobbies" can sweeten the most arduous toil, can render interesting the most monotonous of lives. With some of the characters here described, we were personally acquainted, and we can therefore testify to the accuracy of the author's delineations and observations. Some of these lives read like little idylls. Shut out from the great world that roars outside them, we find them looking to Nature for instruction, and studying her great kingdom with never-tiring zeal. The lives of such men as John Dewhurst, George Caley, Samuel Gibson (who went by the name of the "Scientific Blacksmith"), Richard Buxton (the author of the "Manchester Flora,"—a man who never earned a pound a week in his life!), George Crozier, Elias Hall, the geologist, and others of which this little book treats, read ambitious worldlings a lesson as to the real enjoyments they are constantly passing over. Most of the characters are Lancashire, for among the factory employés there is developed a genuine love of nature, and there may be found some of our best amateur botanists and entomologists. The book is pleasantly and earnestly written, and is a credit both to author and publisher.

To notice such books as this first volume of the *Telegraphic Journal* is somewhat out of our usual line. But it is with pleasure that we can mention it as a most attractively got-up book, the subject-matter as being various and important, and of a kind that must place the readers of such a periodical, *au courant* with all that is taking place in telegraphy in every part of the world.

"In a man, a nervous or sensory impulse has been variously calculated to travel at 100, 200, or 300 feet a second."—*Huxley's "Physiology."*

A NEW ENEMY.

I WISH to say a few words about an enemy which threatens to lay waste one of Europe's most valued esculents, the potato. For a long time North America has had to contend against two foes, which devoured the early shoots and leaves of the potato, and thus destroyed the hopes of the farmer and gardener. These were beetles belonging to the same family as the Blister-fly, and named *Lytta atrata* (or *vittata*) and *Cantharis viniaria*. They can be kept within bounds; but of late a third beetle has appeared among us which really threatens to drive the potato out of cultivation altogether. It bears the name of the Colorado Potato-beetle (*Doryphora decem-punctata*); and should it once reach the Atlantic coast, and be carried unobserved across the ocean, then—woe to the potato-grower of the old country!

Fig. 17. Colorado Potato Beetle in different stages, from egg to perfect insects.

A man must witness the myriad legions of this insect, and the ravages of its never-tiring larvæ, in order to form an idea of the terrible danger with which Europe is threatened. For myself, judging from the tenacity of life exhibited both in its larval and perfect condition, I have not a doubt that it will soon overstep the bounds of North America, and make a home for itself in other lands.

Its true domicile is in the Rocky Mountains, where it feeds on a species of wild potato, *Solanum rostratum* (or *Carolinianæ*). No sooner, however, had the edible potato (*Solanum tuberosum*) been planted by settlers at the foot of these mountains, than Doryphora attacked it greedily; the more largely its cultivation extended westward, the faster did its insect foe travel in an easterly direction, and scatter itself over the land. In the year 1859 it was located one hundred miles west of Omaha city, in Nebraska; in 1861 it showed itself in Iowa; in 1865, not only had it begun to devastate Missouri, but it had crossed the Mississippi in Illinois, everywhere leaving behind it flourishing colonies. In 1868 Indiana was visited; in 1870 Ohio and the confines of Canada were reached, also portions of Pennsylvania and New York; and its entrance into Massachusetts was notified. During the year 1871 a great army of these beetles covered the river Detroit in Michigan, crossed Lake Erie on floating leaves and similar convenient rafts, and in a very short time took possession of the country between St. Clair and Niagara rivers. Having got thus far, in spite of all efforts to stay their progress, there is every reason to believe that before long we shall hear of them as swarming in the streets of New York and Boston (as they already swarm in the city of St. Louis), and then their passage across the Atlantic is a mere matter of time. Moreover, the beetle in its different stages is so entirely unaffected by the extremes of heat and cold, of wet and dry, which it has met with here, that I have no doubt it will care as little for the changes of climate which occur in the temperate zone of Europe, and, once settled, will quickly become naturalized.

The devastations of the Colorado Beetle are all the greater, from the fact of its propagating itself with extraordinary rapidity, several broods following each other in the course of the year. The first batch of infant larvæ appears towards the end of May, or, if the weather be mild, of April. In fact scarcely has the potato plant shown itself above the ground, before the insect, which has been hybernating during the winter, also wakes to life. The female loses no time in depositing from seven hundred to twelve hundred eggs, in clusters of twelve or thirteen, on the underside of a leaf. Within five or six days, according to the state of the weather, the larvæ escape from the egg, and begin their work of devastation, which goes on for some seventeen days, when the little creatures retire below the soil, in order to undergo the pupal condition. After a delay of ten or fourteen days, the perfect insect comes into being, and the business of egg-laying commences anew. In this way, according to recent observations, three broods follow each other; the last, as just stated, wintering below the surface of the ground. No description can do justice to the marvellous voracity of this insect, especially in its larval state. When once a field of potatoes has been attacked, all hope of a harvest must be given up; in a very few days it is changed into an arid waste—a mere mass of dried-up stalks.

At one time the cultivator indulged in the vain hope that Doryphora was a mere passer-by, that he would do his worst, and then move on, without becoming a permanent nuisance. Others, again, fancied that a hot summer and autumn, followed by a long drought in the ensuing year, tended to diminish its numbers. But it has been proved incontestably that the diminution was only due to the circumstance of many of the larvæ perishing, through being unable to enter the ground hardened and baked by the great heat; plenty were left to continue the breed.

Fig. 18. *a.* Colorado Beetle. *b.* Foot of ditto. *c.* Pupa of ditto. *d.* Wing-case, enlarged.

Of the many nostrums that have been employed for the destruction of this beetle, one only has shown itself to be of any value. I mean, dusting the plants with the highly poisonous substance Paris green,—a compound of arsenic and oxide of copper. However, setting aside the dangers of inhaling this deadly mixture while spreading it over the fields, there is the additional peril of impregnating the soil with it,—a peril which experiments carried out at Washington have shown to be well founded. There remains, therefore, only the plan of hand-picking, day after day, the eggs, larvæ, and beetle. But even this operation requires considerable care; for the juice of the crushed insect and its larvæ produces bladders and blisters wherever it comes in contact with the skin. If a wounded spot be touched by it, severe inflammation ensues, which is liable to pass into ulcers, and an application of it to the eye endangers vision to a very serious extent.

Fig. 17, on page 15, gives an idea of the Colorado Potato-beetle in its different stages. The eggs are of a deep orange-yellow. The larvæ on first emerging, are of a blackish hue, which passes quickly into a dark red, with a slight orange tint. On attaining their full size the colour varies between orange, reddish-yellow, and flesh. At *c*, fig. 18, is shown the pupa; at *a* the perfect insect, natural size; a foot is portrayed at *b*; a wing-case considerably enlarged at *d*. The ground colour of the latter is creamy-yellow (*rahm-gelb*), with five black longitudinal stripes, of which the third and fourth unite at the base.

Doryphora does not by any means confine itself to the potato. In places where that esculent is wanting, it will support itself on any other member of the Solanaceous order,—the Egg-plant (*S. melongena*), the Tomato (*S. lycopersicum*), or the Winter-cherry (*Physalis viscosa*). Indeed, in the northern parts of Illinois and in Wisconsin—incredible as it may appear—it has established itself in the cabbage-garden as readily as in the potato-field.

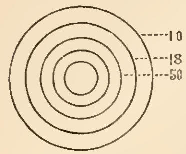
State of Illinois. FR. H.

CELLS FOR MICROSCOPIC OBJECTS.

THE introduction of the Binocular Microscope as a popular instrument has rendered it desirable to mount objects as much as possible in their natural form, necessitating the use of a cell more or less deep to contain them; but the difficulty has been to find a suitable material for their construction and a secure mode of attaching them to the glass slide. It is by no means improving to one's temper to have a pet slide come to pieces through a gentle tap on the table, or some other of the ordinary occurrences incidental to the handling of them, yet it frequently so happens, and has so often occurred to myself, that every fresh slide coming into my possession, either by purchase or gift, is invariably re-cemented to make sure of its safety. Out of the great variety of substances suggested, experience has led me to adopt the use of three only,—paper, tin, and glass. The objection formerly made to the use of paper in leading to the production of fungoid growths upon the object and on the surface of the glass, has been overcome by means of varnish; and slides so prepared, and purposely kept under the most unfavourable circumstances, are, after several years' probation, still as perfect as ever.

There are two ways in which paper cells may be made; one, by coiling it into cylinders and cutting off rings in the lathe, and the other, by "punching" rings out of flat sheets. The former serves well for all depths above the thickness of a sixpence, while the latter is most convenient for all others that are required to be of less depth, and may be adopted even for the thinnest writing-paper. The first-named plan, however, may be dispensed with, as rings of cardboard can be built up to any height with very little trouble or loss of time. The great difficulty hitherto has been in punching out these rings so as to get them of uniform width, that is to get one punch perfectly concentric with the other; but at length a "happy thought" occurred, that has rendered this dilemma "a thing of the past." It appeared obvious that, having punched out the interior of the intended ring, the placing of a kind of button in the aperture with a shoulder projecting beyond, and the exact width of the circle required, would guide the outer punch to its proper place and give us the hoped-for result, which it has done most completely.

The first step would be to provide a series of four or five punches of certain relative proportions, with respect to each other. In the annexed diagram the three outer circles correspond with gun punches of the respective numbers indicated, but the two inner ones are shoemakers' punches of a commoner description, although answering the purpose sufficiently well. The next step should be to obtain a series of brass cones of the form represented at A, B, fig. 19, one fitting into each of the punches except the smallest, while the projecting portion B should fit very accurately, and not too tightly, into the opening made by the punch next smaller in size. Then commencing by punching out the smallest disc, the smallest guide-cone is next inserted and carefully fixed in its place, turning the card over so as to use the sharp edge of the aperture; the punch is lastly placed over this, which guides it to its place, when a sharp blow cuts out the portion required. The different sized rings being thus cut in succession leads to the least possible degree of waste in the material as well as saving in time. In the diagram the front of the outer punch C has been cut away to show the position of the cone in its interior and to give a clearer view of the arrangement and its action, DD showing the width or the resulting ring, which can be varied only by the relative proportions of the punches, which must be determined at the outset.



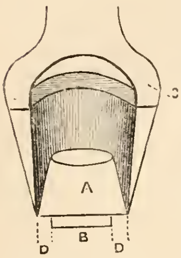


Fig. 19. Punches for making microscopical cells.

The next stage in the process will be to saturate them with varnish. Let a thin solution of shellac be made in rectified spirit of wine (or if cost be more a consideration than fragrance, *methylated* spirit may be used), and placing the rings in a wide-mouth phial, let them be covered with the solution and left so for two or three days closely corked up, when they will be ready to be pressed and dried. Having provided a few score pieces of common window glass about one inch square, let these be spread out on the table and the rings taken out one by one, placed upon them, one in the centre of each square, and then placing them one upon another with a spare piece of glass on the top, in a pile just sufficient to be taken up in the grip of a wooden American clothes-peg, which will thus act as a vice and squeeze them flat, and in which position they may be left until quite dry. I have a stout wooden box about one inch deep and five or six inches wide, partitioned off into compartments, a little over an inch wide, and these being filled with the glass squares containing the rings, a common wood screw is passed through the side opposite the centre of the squares, which then screws the whole up into a compact mass with any amount of pressure. Of course any description of sized or unsized paper, parchment-paper, leather, or any other soft substance, may be cut in the same way, and will serve equally well when only dry objects are to be mounted in them; but when required for fluids, *pure tin* will be found one of the best materials for the purpose, especially as it can be cut in the same manner and with the same punches. This metal may be obtained of Stanton Brothers, in Shoe-lane, rolled to any thickness, at about half a crown per pound, half price being allowed for the spare clippings in exchange, so that but little loss will be incurred by waste. As this material, however, can hardly be cut conveniently of a thicker substance than about the thickness of a new shilling, *glass* has been resorted to in all such cases as require a deeper cell for the retention of fluids. To "punch" a hole through a piece of window-glass may seem a very unlikely proceeding, yet it is in reality one of very easy accomplishment. If the glass be securely cemented down with shellac upon a piece of brass not less than an eighth of an inch in thickness and having a hole in it of the size intended, the centre may be chipped out with a pointed hammer, in a very few seconds, and a rough file will then trim it to the edge of the brass, when it may be removed, and after soaking in liquor potassæ for a few hours to remove the lac, may be ground true, if greater perfection be desired. From the thinnest covering glass and plates a quarter of an inch thick, cells may be readily made in this manner.

The last point to be attended to is securing the ring firmly to the glass slip. If required for fluid, nothing answers so well as *marine glue*, taking care that all parts be sufficiently heated and well pressed together; but if only needed as *dry* cells, a far less troublesome process will suffice. For the circular tin and paper cells I have found no preparation so effective, or so little trouble, as "Priest's Diamond Cement." The parts to be put together should be warm and *free from grease*, and when metal is being fixed, the whole should be warmed up afterwards, to about the melting-point of the cement, as this keeps secure the attachment of the latter. For *putting on covers* it has too the merit of not "running in" while it holds the glass most effectually and is almost colourless. A thin coating of this upon all insecurely fixed cells, embracing the side and touching the cover at the top and the glass slip beneath, renders the whole perfectly secure by tying together, as it were, the cover and the slip, with the ring inside as a support. This cement may be purchased at any chemist's, price one shilling per bottle, holding about three quarters of an ounce, and is prepared for use by placing the phial for a few minutes in hot water.

St. Giles-street, Norwich. W. K. Bridgman.

MICROSCOPY.

Crystals of Lime in the Prawn's Skin.—The skin of the Prawn consists of three layers; between the outer and middle coats the crystals of carbonate of lime appear to lie. In a cast skin no crystals seem to be ever found, nor do any appear in a newly-formed skin. What then becomes of these crystals? Does the water dissolve them, or does the new skin absorb them in order to consolidate it? Perhaps some reader of Science-Gossip may be in a position to answer the above.—*F. B. Kyngdon.*

On Preserving and Mounting Fresh-water Algæ.—The fresh-water algæ are not only beautiful but easily procurable, and would no doubt have received a much larger share of attention from the microscopist were their preservation as permanent objects possible. In the majority of instances, the beautiful colour and arrangement of the endochrome is destroyed by the death of the organism; there are some forms, however, which retain a considerable amount of their pristine beauty after having been mounted many years. The Nostocs are but little changed when mounted in fluid; and the Desmids, although losing their vivid green colour, retain their elegant outlines. The plan proposed by Dr. H. Wood* for the preservation of the fresh-water algæ, according to the author, has given the best results hitherto obtainable. After cleaning them, which he accomplishes in the following way:—"The large filamentous ones may be washed by holding them fast on the slide with a bent needle or a pair of forceps, and allowing water to flow over them freely whilst they are rubbed with a stiffish camel-hair brush, or the mass of specimens may be put into a bottle half-filled with water and shaken violently, drawing off the water from the plants, and repeating the process with fresh additions of water until the plants are well scoured. I find, after trial of acetate of ammonia and various other media, that a very weak solution of carbolic acid is the best possible fluid to mount these plants in"—the difficulty of securing effectually fluid-mounted forms induced Dr. Wood to try the following plan. He makes a solution of gum-damar in benzole, to which previously triturated oxide of zinc is added. This cement should be of such consistency as to flow freely from the brush. It will adhere if washed properly when the cell-cover is pressed down, even when glycerine is used as the preservative medium. Its advantage lies in the circumstance that the glass cover can be placed upon the ring of it whilst still fresh and soft, and that in drying it adheres to both cover and slide, so as to form a joint between them of the width of the ring of cement. The method of mounting with it is as follows:—A ring of it is made, by means of a "turntable," on a slide, which is put aside to dry. When required for use, the slide is again placed on the turntable, and a new ring of cement put directly over the old one. The specimen is immediately within the cell, and the requisite quantity of carbolated water added. The cover, which must be large enough to entirely or nearly cover the cement ring, is now picked up with the forceps, the under-side being moistened by the breath, to prevent adhesion of air-bubbles, and placed carefully in position. It is now to be carefully and equably pressed down with some force. By this any superfluous water is squeezed out, and the cover is forced down into the cement, which rises as a little ring around the edge. The slide may now be put aside to dry, or better, an outside ring of cement run round it in the usual manner. Unfortunately, the author does not state the length of time he has used this method. My experience of soft cements is that in a shorter or longer period they almost invariably run in, and I much fear gum-damar will not prove an exception.—*F. K.*

* "A Contribution to the Natural History of the Fresh-water Algæ of America." By Dr. H. Wood.

On Mounting Microscopic Objects.—We beg to draw the attention of our microscopic readers, who are always interested in anything relating to the mounting of objects, to the second edition of Davies's little book on this subject, which has just been issued by Hardwicke, Piccadilly. This edition is considerably enlarged; and, as its author was too unwell to see the sheets through the press himself, this edition has been edited by Dr. Matthews, to whom Mr. Davies handed over his additional notes, &c. A prefatory chapter has been added, and such extensions made as will introduce the book to a new class of readers—the medical students and practitioners. The editor has done his work well, and we can now confidently recommend this able little book as the cheapest and most comprehensive which the young miscroscopist can obtain.

BOTANY.

Plant Crystals.—Professor Gulliver, referring to his descriptions and figures of Raphides, Sphæraphides, and long crystal prisms, given in Science-Gossip, May, 1873, continues his researches in a memoir, illustrated with a plate containing ten figures, in the *Monthly Microscopical Journal*, Dec., 1873. Of this last paper, the subject includes observations "on the crystals in the testa and pericarp of several orders of plants, and in other parts of the order Leguminosæ." These crystals he names "short prismatic crystals," in order to distinguish them from the other and very distinct forms mentioned above. The short prismatic crystals are constantly present in the testa of many orders of plants, and as constantly absent from the same part in other orders. But though not occurring in the testa of Leguminosæ, the short prismatic crystals are surprisingly abundant in the calyces, leaves, bracts, pods, and liber of this order. In one inch of the midrib of a leaflet of clover, for example, he counts no less than 21,000 of the crystals. They are very diverse in form and size, but are commonly about $\frac{1}{3000}$ inch in diameter. They appear to be composed chiefly of oxalate of lime, and, occurring in such abundance in the leguminous plants most relished by ruminant and other animals, we may well admire one of the several sources by which nature, as now proved, has so plentifully provided this earth with the very provender on which many animals most greedily feed. And the necessity of lime in the animal economy, from invertebrates up to man himself, has long been known. The short prismatic crystals in leguminous plants commonly occur in chains or chaplets of cells, each cell containing in its centre a single crystal; and the chains are most abundant along the course of the fibro-vascular bundles of the leaves and legumes, but occur dotted throughout many membranous parts. These crystals are beautiful microscopic objects, and make very pleasing and instructive preparations, either dried or in glycerine. And as to the view which has often been entertained, that such crystals so regularly produced in organized cells, are merely excrementitious products or freaks of Nature of no relation to or value in the life and uses of the plant, the author concludes that such an opinion is utterly untenable.

Puccinea Malvacearum.—Can any of your readers explain the rapid diffusion of this and other micro-fungi? This puccinea first made its appearance during the last summer in the grounds of the Marquis of Westminster, at Clevedon, near Maidenhead. I afterwards received a specimen from Salisbury; and on my return to Devonshire, in August, found it plentifully on mallows in this neighbourhood, more than two hundred miles from the spot where it first appeared, and caused such destruction among the mallows and hollyhocks. We can understand how the spores of fungi usually abundant may float about in the air, biding their time to attack their favourite plant, but here our conjectures are at fault. Students of micro-fungi are now so numerous that if this species had occurred in Britain before, it could scarcely have failed to be recognized. Whence did it come, and how?—*J. P. Belmont, Dartmouth.*

The Discovery of Verrucaria ochrostoma.—At the November meeting of the Brighton and Sussex Natural History Society, the honorary secretary, Mr. Wonfor, announced the receipt from Mr. G. Davies, for the Society's Herbarium, of that very rare lichen *Verrucaria ochrostoma*, found this month by Mr. Davies in the Weald of Sussex. This lichen had been lost till now, not having been met with since Borrer first found it in 1850. It was also mentioned that *Artomia spadicea*, new to Sussex, was found by the same gentleman, December, 1872, in Ashdown Forest, near where *Calicium septatum* grows, and that he had found *Lecanora Hageni* with *L. sophodes*, var. *lecideoides*, near Cuckmere.

Adulteration of Pepper.—M. Bouchardat has communicated the result of his examinations of a large number of samples of ground pepper, as sold in France. He found that the most common adulterant was one prepared by drying and finely pulverizing the parenchyma of potatoes, left as a residue in the manufacture of starch. Among other adulterants were lentil flour, earthy matter, chalk, and linseed cake. A microscopical examination will always enable the observer to detect such adulterants present.

A New Beech Blight.—In Westphalia the beech-trees have been recently attacked by a new form of blight, which commences on the bark, and finally covers the tree with a snow-white down, to the ultimate destruction of the tree. Under the microscope, this blight is seen to consist of fine threads, among which there occurs a small insect apparently an undescribed species. The threads, which are secreted by the insect, are of wax, which has a melting-point of about 80 degrees, and the per-centage composition of which is, carbon 81·39, hydrogen 13·58, and oxygen 5·03. Both as regards its composition and melting-point, this new wax is very near that of Chinese wax.

Asperities or Callous Points in the Leaves of Bryonia alba.—At a late meeting of the East Kent Natural History Society, Professor Gulliver gave a demonstration of the true nature of the roughness, hitherto but vaguely described by botanical writers, on the leaves of the Red Bryony. He showed that each of these callous points is 1-114th of an inch in diameter, and made up of a congeries of smooth, shining, hyaline, rounded granules, having an average diameter of 1-666th of an inch; and that they are composed of carbonate of lime. Hence, he suggests that for them descriptive botany should in future substitute the words *calcareous granules* for the vague epithets heretofore used in botanical books.

Fungological Excursions.—Late in October, the Woolhope Club made a fungological excursion, when four species new to Britain were discovered. These were *Hygrophorus fornicatus*, *Agaricus icterinus*, *Clavaria curta*, and *C. rufa*. After the fungus supper held at the close, papers were read by Mr. Plowright, of Norfolk; Mr. Broome, Mr. Renny, Mr. Phillips, and Dr. Bull, relating to fungology.

ZOOLOGY.

STENOCEPHALUS AGILIS.—The "works on Entomology" to which Mr. J. O. Harper (SCIENCE-GOSSIP, No. 106, p. 228) has referred for an account of the "ovipositor saws" of this insect, are, judging from the one mentioned in the note to his paper, probably of no scientific value whatever. The structure of the rostrum and genital segments of the *Hemiptera heteroptera* is, of course, noticed in a general way by Westwood, in his admirable "Introduction;" and in the only work exclusively discussing the Bugs in this country, viz. "The British Hemiptera," by J. W. Douglas and J. Scott, published by the Ray Society (of which all naturalists should be members) in 1865, will be found a more recent and ample account of the structure referred to. The lancets of the rostrum are simply two of the four setæ representing the normal mandibles and maxillæ of insects, and which in all the *Heteroptera* are included in the rostrum. The "ovipositor-saws" at the terminal segment of the abdomen, are simply the genital segments, which in the description of the genus *Stenocephalus* (as in the account of all other British genera) are, as to both male and female sexes, fully described by Douglas and Scott, "Brit. Hem.," p. 141. This structure, in one of the type forms of the order, is also well figured in outline at p. 1 of their work.—*E. C. Rye.*

HELIX OBVOLUTA.—In reply to Mr. C. Griffith's inquiry respecting *Helix obvoluta*, I beg to say that the species has an extensive range on the Continent. Pfeiffer says ("Mon. Heliceorum," i. 413), "Habitat in Europæ borealis et mediæ terris plerisque." In his last edition (v. 423), he gives as the habitat "Europa media" only. Jeffreys ("Brit. Conchology," i. 230) states that it occurs in France, Germany, Switzerland, and Italy; and I posssess specimens from Hungary. Amongst other French localities, it is found in the Bois de Meudon, two or three miles south-west of Paris. *Helix obvoluta*, in fact, is only one of the many instances of species that are very abundant on the Continent and rare in the British islands. *Ctausilia Rolphii* is a similar case, and every entomologist knows of many such in his branch; *e.g. Carabus auratus, Calosoma sycophanta*, &c.—*C. P. Gloyne.*

INDIAN INSECTS.—As my duties lead me to travel a good deal in the districts of western India, I have, of course, ample opportunity of obtaining specimens of insects, &c.; but, having no books of reference, am unable to say, as a rule, what are already known to naturalists and what not. The difficulty of preserving specimens in cabinets is almost insurmountable. I have had the work of two years destroyed in one week during the monsoon. I propose in future to send home my gatherings in small batches, and with this view would be glad to correspond with any one interested in the subject, who would send me the names of the specimens and where described, or any works on the entomology of India, in return.—*A. Stormont.*

SNOW-BUNTINGS.—Perhaps it may be interesting to some of the readers of SCIENCE-GOSSIP to know that an extraordinary number of Snow-buntings (*Emberiza nivalis*) were taken the last week in November. One man caught 250 in a field of oat-stubble near Brighton, some of which are very beautiful. To the lovers of the feathered tribe these birds will be very welcome. They are a good aviary bird; their food is canary-seed; they are very hardy, and soon become tame.—*Chas. W. Rudd.*

THE BREATHING OF FROGS.—Mr. W. Müller has been comparing the amount of oxygen consumed by two species of frog, the Green Edible Frog (*Rana esculenta*) and the ordinary Brown Frog (*R. temporaria*), in order to ascertain whether the amount consumed by the more voracious species was not the greater. From these experiments he has concluded that the Brown Frog consumes more oxygen than the Green Frog. When hungry they consume less oxygen, but there is still the same difference between the species. In winter time, under water, they consume the same amount of oxygen as when breathing air. Frogs frozen in ice for eight hours nevertheless breathed at the normal rate after being released. The amount of oxygen consumed by the common mouse (*Mus musculus*) is twenty-four times as great as that of the frog.

SPONTANEOUS CHANGES IN EGGS.—M. Gazon, who has previously shown that the putrefaction of eggs corresponds with the development and multiplication of *vibrios* within them, has contributed the result of some further investigations on this subject. He thinks that these organisms might be easily introduced into the egg during its passage down the oviduct. Recent experiments confirm this opinion. M. Guyon examined the oviduct of a recently killed fowl, and found there both *bacteria* and spores of fungi.

GEOLOGY.

SUB-WEALDEN EXPLORATION.—At the November meeting of the Brighton and Sussex Natural History Society, Mr. Woufor reported that Mr. H. Willett had sent him for examination the second specimen of *Lingula ovalis*, found at a depth of 294 feet, in the Sub-Wealden boring. It was believed they had reached the Kimmerage clay, and some even thought they were nearing the Palæozoic rocks.

SHELLS OF THE LANCASHIRE AND CHESHIRE LOW-LEVEL CLAY AND SANDS, BY T. MELLARD READE, F.G.S.—This was the subject of a paper recently read before the Geological Society of London. The author commenced by explaining a section in a cutting at Booth-lane Station, in which most of the beds seen about Liverpool are typically represented. He then gave a list of the localities in which shells were found, and stated that in all forty-six species had been met with, distributed through the clay-beds, those found in the sand-seams being rare and generally fragmentary and rolled. The shells most commonly found entire are usually of small size, and of a form calculated to resist pressure,—such as *Turritella communis*, *Trophon clathratus*, and *Mangelia turricula*. *Fusus antiquus* and *Buccinum undatum* are generally represented only by worn fragments of the Columella, and *Cyprina islandica* is always found in fragments. The author thought that the association of the various species distributed without order through the clays shows that they could not have lived together on the same bottom, but that they must have been to a great extent transported. He contended that the admixture of shells in the Boulder-clay was due to the tendency of the sea to throw up its contents on the beach; whence changing currents and floating ice might again remove them, and to the oscillations of the land bringing all the beds at one time or another within reach of marine erosive action. He maintained that it is in the distribution of land and sea at the period of deposition of the Lancashire deposits, and not in astronomical causes, that we must seek the explanation of the climate of that period, the conditions of which he endeavoured to explain by a consideration of the proportions of the species and the natural habitats of the shells found in the drifts.

Geology of the Redesdale Ironstone District.—This is the subject of a valuable paper by G. A. Lebour, F.G.S., reprinted from the Transactions of the North of England Institute of Mining and Mechanical Engineers. The author describes the limits and physical features of the district, the stratigraphy, and the ironstone shale, as well as the "faults" traversing the strata. He also gives a detailed account of the various sections passed through at the different pits. A contour map of the ironstone district at Redesdale accompanies the paper, which is throughout of an important character.

Mud-Craters on the Persian Coast.—At the last meeting of the Geological Society, Lieut. Stiffe read a paper on this subject. He stated that the coast of Mekran, extending from near the western frontier of India to the mouth of the Persian Gulf, was stated by the author to be a nearly rainless district, consisting of clay plains with precipitous tabular hills, the former veined here and there with crystalline gypsum, the latter composed of clay capped and sometimes interstratified with coarse, friable, fossiliferous calcareous strata, from five to thirty feet thick, supposed to be of Miocene age, and all horizontal, or nearly so, except at the extreme east and west, where the strata are inclined at an angle of from 40° to 60°. Along the coast there are no distinct traces of volcanic action, but on the north coast of the Persian Gulf a similar formation has been much disturbed by the protrusion of recent volcanic material; near Jâshak to the west there is a hot mineral spring, and near Karâchi there are springs of pure hot water. The author described the mode in which denudation is effected in this region by occasional heavy rains, and by the constant action of the sea upon the coast, and then noticed the occurrence, within a few miles of the shore, of numerous peculiar mud-craters, forming hills varying in height from 20 to 300 or 400 feet above the plain, of a regular conical form, with truncated tops, and the sides sloping at an angle of about 40°. The summits of these hills present a circular cup with a narrow border, filled with semifluid mud, which occasionally flows slowly over the margin of the crater. The author considered that the conical hills have been formed solely by these overflows. He believed that a small shoal occurring off the coast near Jâshak might be produced by one of these craters, and was inclined to ascribe their existence to hydrostatic pressure rather than to volcanic action, especially as by the concurrent testimony of several natives the discharge from the craters is greater during spring-tides. The thickness of the clay forming the plain is probably very considerable; it extends for some miles from the shore, sinking gradually to 20 or 30 fathoms, when there is a sudden and often precipitous descent to a depth of 300 or 400 fathoms. The author suggested that, since the deposition of the Miocene beds, the great submarine cliff may have been raised above the sea; that the land was then depressed to near its present level, causing the removal of the beds to the present coast-line, and that a further depression followed by upheaval gave origin to the inland cliffs. Evidence of the last depression is furnished by the presence of borings of lithodomous mollusca in the cliffs considerably above the present sea-level.

NOTES AND QUERIES.

Pollen-grain.—In the botanical column of the October number, "R. H. N. B." asks as to the probable plant from which a pollen-grain is derived of which he gives a figure, numbered 147. It appears to me that it may be a representation of the pollen of *Passiflora cærulea*, of which a good figure is given in "The Microscope," by Dr. Carpenter, figure 189; but that the figure is not perfectly delineated by your correspondent, or may have been examined by an inferior lens, or possibly not illuminated to the best advantage.—*C. M. Major.*

Scirpus parvulus.—In the exchange which you kindly inserted for me in a recent Science-Gossip relative to the above plant, I stated that Arklow, co. Wicklow, was "the only British station at present existing," where it grew. That statement was erroneous, and I desire with your permission to correct it at once. The Hampshire station, is, I believe, extinct, but through the kindness of Mr. A. Bennett, I learn that *Scirpus parvulus* was discovered in 1869 near Poole harbour, Studland Bay, Dorset, by Mr. J. C. Mansell. I may add, that although I visited the Arklow station twice this autumn for specimens, only about ten plants were found in flower. Thousands occurred in the barren state.—*Richard M. Barrington, Fassaroe, Bray.*

Corn-crake.—I fancy the birds whose decrease in England during the last few years Mr. Anderson and Mr. Warner call attention to, must have migrated to North Wales; for I really never heard so many crakes in any place, as I did near Beaumaris, a small town in the island of Anglesea, where I have been living for the last three years. I am sure there must have been a small colony of them in the field attached to a house I rented. The rasping noise of their cry often kept me awake a great portion of the night, and directly I had the grass cut they moved to other quarters, sufficiently near the house to be heard. I like the wild cry of the Plover and of various sea-birds, as they are borne away by the night wind over the sea, but the note of the corn-crake, like the scraping of a slate-pencil, puts one's teeth on edge.—*Helen E. Watney.*

Water-rat, or Vole (*Arvicola amphibius*).—One day in August last I noticed a large heap of freshly turned-up earth among growing potatoes in our garden, and thinking a mole to be the cause, a trap was procured, and next morning the culprit was secured. At the first glance I took it to be a common brown rat, but looking at it more closely found it was a water rat, and the man from whom the trap was procured declared that these aquatics burrow quite as much as the mole itself. This I do not dispute, seeing the effect of its industry around, but what I consider very strange, is the fact of this lover of water being located in a walled-in garden at a great distance from its more congenial haunts. In Letter 28 of White's "Selborne" a somewhat similar instance is related, the rev. gentleman being apparently as much puzzled as myself to account for such a deviation from regular habits. In that case, the animal was turned up by the plough in a chalky field at a distance from water, and was snugly ensconced in an "hybernaculum," well provisioned with potatoes.—*W. H. Warner, Kingston, Abingdon.*

Duration of Bee-hives.—In a mansion in Kent, recently renovated, it became necessary to disturb a colony of bees which had been known for thirty years to have inhabited the roof. A large quantity of honey was procured, and 40 lb. of comb were removed from between the rafters. Is it an unusual circumstance for bees to perpetuate themselves for such a length of time in the same locality?—*A. L.*

Wasps.—Some time ago, as I was returning home from a walk, I strolled into an unfrequented lane where I saw the following curious incident. In the middle of the roadway a large wasp seemed evidently engaged in some very important undertaking. Approaching carefully, I found it severing the head from the body of one of its own species. Unfortunately, my presence caused the insect to fly off before it had completed the separation, leaving the sufferer, however, quite dead. I have heard that wasps make war on every other fly, and that even the spider himself dreads their approach, but I have neither heard nor read of anything like the above incident.—*G. O. Howell.*

Mounting Microscopical Material.—Is there any one who will mount microscopical material sent to him? I have a great many lingual ribbons of mollusca collected in Jamaica, but unmounted, which, if mounted, would be very useful for exchanges.—*C. P. G.*

Young Mice and their Mother.—On looking in a mousetrap I found a mouse with six young ones (apparently born in captivity). On examination it was discovered that all the young mice were headless, their heads having been, evidently, devoured by their hungry mother. Is it usual, when pressed by hunger (there being no bait left), for the old ones to devour the heads only *of their offspring?* When taken out of the trap the mouse was nearly dead.—*E. S.*

Mounting Mosses, &c.—Could any of your correspondents inform me of the best way to mount the leaves of mosses, &c., for the microscope? It has been recommended to mount them between slips of glass, so that they can be moistened when it is wanted to examine them; but I find that if this is often done they ultimately decay. I have tried balsam, but without good results. Would the substance called coaguline answer the purpose?—*H. W. J.*

British Shrews.—I think "J. W." will find that in the new edition of Professor Bell's "British Quadrupeds," now in the press, the "Oared Shrew" will be omitted, as it is now considered to be only a variety of the Water-shrew (*Sorex fodicus*). I have examined several intermediate varieties, and am of opinion that the *S. ciliatus* of Sowerby (*S. remifer* of Yarrell) is not a true species (the continental *S. remifer*), as believed by Mr. Yarrell.—*T. S.*

Local Names.—I had a collection of birds' eggs given me a short time since, and among them were two labelled "*Feather-poke*" and "*Ground-lark.*" Both the eggs are about the size of the House-sparrow's. The names are evidently local, but I cannot find either of them in Atkinson's "British Birds' Eggs," although it contains most local names. Perhaps some of your readers will inform me. It would, I think, form a very interesting volume if some one were to get the name of each bird, animal, or in fact anything of interest from each county, as almost every bird, &c. has a local name, which is very puzzling in other neighbourhoods.—*Arthur Smyth.*

Microscopical Queries.—Will any of your readers inform me what are the best media for attaching ebonite cells to the glass slips? I have tried Kay's coaguline, cements, marine glue, &c., but do not find any of them trustworthy. Could you also inform me where I should be likely to procure a micro-lantern on hire for a night or two? I want a lantern suitable for exhibiting transparent microscopic slides on a screen.—*Micro, Hull.*

Mounting Crystals.—A "Constant Reader" (p. 237) will find two very good articles on Microscopic Crystals in Science-Gossip for 1866, at page 33 (February), and page 125 (June).—*A. S.*

Strange Companions!—That a spider and a slug should choose a resting-place within an inch of each other seemed somewhat singular. Indeed, when I noted that the slug, which was about an inch in length, was reposing under the angle of a wall, close to the spider and its abode, I thought at first that, though the arachnid was much less in size, it had made a victim of the slimy individual. I believe instances have been frequently noticed where snails have returned again and again to the same spot after taking their excursions. So it was with this particular mollusk; for he was sometimes to be found "at home," at other times absent, during the few days I observed him. The close was tragical; the spider quitted her web, having attached thereto her bag of eggs, and a human enemy of slugs watched the return homewards of the spider's companion, and by the application of a well-adjusted pinch of salt, brought him to his mother earth—a slimy mass!—*J. R. S. C.*

Caged Birds and Cats.—It is noticeable that caged birds of the Finch tribe are very variously affected by the approach of a cat. Canaries are not, in most cases, particularly alarmed, unless a cat makes some demonstrations of attack; and I have known some canaries that will chirp, in a sort of friendly recognition, as a cat passes that they have been accustomed to. The goldfinch and the siskin, naturally timid birds, are more fearful of the feline race than are the linnet and chaffinch. But the bullfinch exhibits the most excessive and ludicrous alarm; the sight of a distant cat throws him into an agitation, and should one appear near at hand, the bird will continue peering about for a long time even after it has gone; still suspicious that its foe is lurking somewhere. It is probable this strong instinctive dread of a cat is connected with the natural habits of the bullfinch; the bird being partial to fruit, and frequently found in gardens and orchards, where its life is in danger from cats prowling about these places.—*J. R. S. C.*

Euplectella.—A friend of mine has a specimen of *Euplectella speciosa*, within which is some crustacean, what, I know not, but it measures quite 2 inches long, and has somewhat the appearance of a crayfish, minus the antennæ. How could the animal have found its way into the interior of the Euplectella, in which there is no opening or fracture of any kind? The prisoner (of course long since dead) is detached, and rolls about in its cage, when the latter is moved. Altogether the matter has puzzled me as much as did the apple and the dumpling in the case of "good King George," and I shall be thankful for an explanation.—*W. W. Spicer, Itchen Abbas.*

Praying Mantis.—A correspondent in your September number asks for a description of the *Mantis oratoria*, or Praying Mantis. I have frequently seen it. Some years since a mantis nest was brought, amongst other curiosities, by one of our family, from the south of France. It was attached to a piece of quartz. For several weeks it remained forgotten in a drawer. It was early in the summer and the weather was unusually cold, and one day, when it was shown me, I remarked that if there were life in it, it would have little chance of developing without heat of sun or fire, and I forthwith placed it on the mantelpiece. It had not been there two hours, before we were startled to see a number of little creatures, about the size of the common gnat, but wingless, emerging from the folds of the nest, and for the next twenty-four hours they continued to hatch at intervals, until about fifty in all were born. On first gaining their liberty they were exceedingly active, and their antics were most curious, whilst they always preserved the praying attitude, as they fought or ran over one another, seeking no doubt for the food they could not find. We tried them with everything we could think of likely to attract their baby appetites; but sugar, flowers, meat, insects, alike remained untasted, and we now saw that our vision of bringing up a young brood of praying mantises was doomed to disappointment, as one after another grew weak, shrivelled, and died. The nest, which is soft and covered with a thin horny substance, shows a series of scales or folds, and it is now little changed, excepting that it has shrunk a little in size.—*Falmouth.*

White Sparrows.—I observed in a recent impression remarks from "W. F. D." on the appearance of a sparrow "whose plumage is *very nearly* entirely white," &c. Although a sparrow with white feathers is doubtless a *rara avis*, yet they occur more frequently than is supposed. A few years ago, when living in Hampshire, there was a white sparrow that bred in the thatch of a barn close to my house. I shot it, and found it was of pure sparrow breed, but *perfectly* white; and there were afterwards in the same locality several others which were piebald; doubtlessly part of the progeny of the white one.—*T. V. C.*

Strange Freak of a Sparrow-hawk.—I was out with my rod towards the fall of the year, whipping for trout on the higher part of one of the rivers that take their rise in the centre of Dartmoor. There was plenty of flood tumbling over the grey rocks in foamy cascades, and eddying swiftly past the sharp turns in its course; but the sun shone brightly; the water was clear, and the wind from the east, and whip as I would I could not do much with the fish. They sported to the surface but would not take home, jumping over the red palmer, and flicking the blue dun with their tails; at last, after sundry changes of my fly without satisfactory result, I reluctantly resorted to a worm, and had better luck, in spite of the clearness of the water. I had fished up to where a high bridge crossed the stream, and had struck my rod into the ground while I sat down for a short time against the buttress of the bridge. A worm was on the hook, and dangling by a short line in the air, when suddenly there was a rush from the other side of the bridge, and a hawk swiftly emerging from under the arch seized the worm and flew off to the full tether of the line, the jerk pulling the rod to the ground, and at the same time pulling the bait out of the mouth of the bird, which flew off in affright. I regretted he had not been hooked, as it would have been satisfactory to know whether he could have been held.—*T. V. C.*

How to Destroy Ants.—In answer to your correspondent "E. B. F.," I have found that boiling water will invariably destroy a whole nest of ants. Of course hot water cannot be used if the ants have taken up their quarters in grass; but in any other locality, I have generally disturbed their nest and then placed a flowerpot downwards, on or in close vicinity to the nest. In a short time they will have reconstructed their home, and large numbers will have collected under the pot, when boiling water will soon put an end to their existence. Half a pint of petroleum and water in equal quantities will also completely extirpate them.—*A. P. Howes.*

NOTICES TO CORRESPONDENTS.

E. H.—Your article is in type, and will appear in due course.

B. Belfield.—Your specimen of female fern *(Athyrium filix-fœmina)* is very remarkable. It answers to the description of the var. *trifidum*, in Newman's "History of British Ferns," better than to any other, and we have no doubt this is the variety the specimen belongs to.

J. Aitkin.—The white crust which you described as so abundant on the bark of beech-trees, and of which a specimen was forwarded, is not of vegetable origin, and therefore not a fungus or lichen. It is of animal origin, formed of a species of *Cynips*, like the "apple-blight." At one time it was considered to be a fungus, and was then named *Psilonia nivea*.

R. Standen.—Your drawing is that of the Great Saw-fly (*Uroceras gigas*).

Mrs. W.—You had better consult a practical nurseryman about the roots of your cherry-trees. His experience will at once lead him to say what you had best do to arrest the attacks of the insects and fungi.

C. L.—Read the paper on "The Formation of Chlorophyll," in the November number of S.-G., for information as to whether sunlight affects a fire. You will there find experiments related which prove that it does.

R. W.—Genuine thanks for your hints as to the matter on our last page.

T. L.—Your specimen is evidently a stunted form of *Delesseria aluta*.—*W. H. G.*

J. V.—Your specimen of *Bryopsis plumosa*, with a so-called green parasitic growth attached, was forwarded to one of our best algologists for identification. He writes, "It looks like half a dozen different things, but it is so muddled together and so interwoven that I hardly know what to say of it. I have given what time I had to spare to it, and believe it to be some abnormal or undeveloped filaments of *Bryopsis plumosa*. I do not think it is a parasite."

J. P. Greely.—The specimen inclosed was one of the wire-worms, the larva of a beetle It is difficult to prescribe a remedy for its attacks. Perhaps some of our readers can, and will reply.

J. B. Davies.—Your fronds are undoubtedly those of *Lastrea cristata*, var. *uliginosa*, now very scarce. Pray, preserve the habitat.

H. G.—They are caused by an insect, a species of *Cynips*, and are known as "Oak-spangles" and "Buttons." See "Half-Hours in the Green Lanes." (London: Hardwicke).

E. W.—The fern is *Asplenium lanceolatum*; the lichen a *Cetraria*.

W. E. Sharp.—Your eggs never reached us. Perhaps they were disposed of in the transit, unless well packed.

J. Wilson.—The parasites on the badger were *Trichodectes crassus*, Denny's "Monograph," plate 17, fig. 3. It is distinguished by the notch on the top of its head.—*I. O. W.*

J. P. B.—We are sorry that your notice reached us too late for insertion in the December No. of Gossip.

J. M.—We shall be happy to get your Mosses named for you if you will forward them (properly packed) to our office.

H. W. I.—Fungus on *Pellia* from Brazil is *Uredo Marchantiæ*—I think it is undescribed.—*M. C. C.*

J. H. S. J. (Lewes).—The fungus on leaves of *Smyrnium olusatrum* is *Trichobasis petroselini*.

EXCHANGES.

Clausilia Rolphii, *C. laminata*, and *Helix Cartusiana*, for *Clausilia biplicata*, *Clausilia rugosa*, var. *dubia*, *Helix revelata*, *Helix lamellata*, *Limnæa glutinosa*, and *L. involuta*.—Address, J. Fitz Gerald, 10, West-terrace, Folkestone.

Pupæ of *H. Pisi*, for other common pupæ or ova.—J. Pickles, 12, 13, Warehouse-hill, Leeds.

Fifty Australian Sea-weeds, named and mounted, for East or West Indian, North or South American Seaweeds, mounted or unmounted.—Address to be obtained from Mr. Hardwicke, 192, Piccadilly.

The First Vol of "Grevillea," unbound, for Land or Freshwater Shells.—T. Hagger, Repton, Burton-on-Trent.

Lepidoptera and Pupa of *P. Bucephala*, and *H. Pisi*, in exchange for other Pupæ or Birds' Eggs; many common species of each repuired.—Thos. H. Hedworth, Dunston, Gateshead.

British Land and Fresh-water Shells for American Land and Fresh-water Shells.—David Whitehead, 70, Phœbe-street, Regent-road, Salford, Manchester.

Polariscope Scales of Sea Buckthorn (S.-G., p. 278) and Vegetable Ivory, for other mounted objects.—Send list to C. C. Underwood, 25, Gloucester-place, Portman-square, London.

I have the following Duplicates:—Blysmus compressus; Campanula patula; Cuscuta europæa; Epipactis grandiflora; Geranium phæum; Monotropa hypopitys; Neottia nidus-avis; Ophrys apifera; Orchis ustulata, O. elatifolia, O. pyramidalis; Orobanche minor; Polygonatum multiflorum; Thesium linophyllum. Desiderata—other plants.—E. A. Hall, Whatton Manor, Nottingham.

I have an Album (Oppen's) containing 702 stamps, also *Lichen Hypnoides*. Anything useful taken in exchange.—Mr. W. Thomas, Ray Lodge, Lingfield, E. Grinstead.

3*a*, 16, 31, 46, 68, 122, 259, 286, 977, 1325, 1338, &c., Lon. Cat., offered for 3*b*. 4 vars., 11 vars., 22, 24, 33, 36, 45, 47, 228*b*, 235*b*, 237, 238, 240*b*, 242, 243, &c.—John E. Robson, Sea View, Hartlepool.

Lepidoptera and specimens of *H. virgala*, *H. caperata*, var. *ornata*, *H. hispida*, *H. arbustorum*, *H. rotundata*, &c., for other Shells and British Birds' Eggs.—W. K. Mann, 17, Wellington-terrace, Clifton, Bristol.

Can any one oblige with *living* Plants, or Seeds, of *Eleagnus*, *Deutzia*, or *Hippophæ rhamnoides* (Sea Buckthorn)? Say what exchange.—J. G. R. Powell, Braw-hill House, Leek, Staff.

Wanted, well-mounted slide of *Triceratium*; will give a well-mounted slide in exchange.—F. M. Swallow, Blackrod, near Chorley, Lanc.

Section of Cuttle-bone, ground-plan (opaque), and of Charob-seed (polar), for other good objects.—Send list to R. H. Philip, 23, Prospect-street, Hull.

Section of Leg of Camel in exchange for other Microscopic objects.—J. M. Hoare, The Hill, Hampstead.

Fossil Diatoms from Isle of Mors, Jutland, in exchange for other good slides or Barbadoes polycistina, unmounted.—Apply to F. Lazenby, Sarum-villas, Basingstoke.

British Lepidoptera and Coleoptera, Foreign and British Shells and Limaces offered for Foreign Shells, or British Land, Fluviatile, and Marine.—M. M., Post Office, Faversham, Kent.

"The Microscope," by Jabez Hogg (fifth edition), and a good Writing Diamond, for well-mounted Microscopic Objects.—A. C. Rogers, Red Lodge, Bassett, Southampton.

Well-mounted Microscopic Slides of Marine Algæ, 40 varieties, also some small Star-fish, unmounted, for good Slides.—R. T. Smith, 25, St. Alban's-street, Weymouth.

Good specimens of *Helix arbustorum*, *H. ericetorum*, *Clausilia laminata*, *C. rugosa*, *Planorbis vortex*, *Pupa secale*, *P. umbilicata*, and *Cyclostoma elegans* for other Shells.—R. Taylor, 6 Everleigh-street, Tollington-park, N.

Collection of 50 Species (160 specimens) of British Birds' Eggs arranged in trays, in box, for Microscopic material or Works on the subject.—R. Taylor, 6, Everleigh-street, Tollington-park, N.

BOOKS RECEIVED.

"Monthly Microscopical Journal." December.
"Journal of Applied Science." December.
"Les Mondes." December.
"Land and Water." December.
"The Conservation of Energy." By Prof. Balfour Stewart. London: King & Co.
"The Telegraphic Journal." Vol. I. London: H. Gillman.
"Manners, Customs, and Dress during the Middle Ages." By P. Lacroix. London: Chapman & Hall.
"Man and Apes." By St. George Mivart. London: Hardwicke.
"Waste Products and Undeveloped Substances." By P. Simmonds. London: Hardwicke.
"Mind and Body." By Dr. Bain. London: King & Co.

Communications Received up to the 12th ult. from—W. K. B.—F. K.—K. H.—A. C.—C. G. B.—E. R.—J. R. S. C.—J. J. R. B.—G. G.—G. W. V. S.—W. H. B.—E. E.—T. W. W.—J. S. H.—J. A.—S. S.—E. G.—G. R.—H. B.—T. B. K.—J. H.—T. H. H.—J. P. B.—W. W. S.—E. M. M.—J. G.—H. G.—W. S.—D. W.—S. T. P.—C. C. U.—J. W.—E. W.—C. E. F. G.—T. O. W.—R. S.—A. H. S. T.—Dr. T. O. W.—C. W. L.—W. T.—H. T. M.—M. W. T.—H. A. M.—J. G. R. P.—J. H. M.—A. A.—H. W.—J. L. H.—A. C. L.—M. A. L.—R. W.—R. T.—A. S.—W. D. E.—C. E. B.—C. P. G.—W. H. W.—R. A. P.—J. O. H.—J. T.—R. T. S.—F. A. A.—W. C.—R. H. P.—E. A. H.—A. S.—W. S. P.—F. M. S.—E. B. F.—F. B.—J. C.—H. E. W.—J. P.—C. J. W. R.—J. M. H.—W. K. M.—J. E. R.—G. B. C.—J. E.—F. L.—R. M. B.

HISTORY OF THE DIATOMACEÆ.

(*Continued.*)

IN the year 1827 C. A. Agardh discovered several new diatoms, which he described in the Regensburg *Botanical Journal*, and mentions for the first time the genera *Micromega*, *Licmophora*, and *Homœocladia*. The same algologist wrote more particularly of this family in four theses, which appeared with the title "Conspectus Criticus Diatomacearum;" in the first and second he described a great number of forms, partly already known and partly new, under the genera *Cymbella*, *Schizonema*, *Micromega*, *Berkeleya* (this genus was constituted by Greville in 1827), *Homœocladia*, *Gloeodictyon*, *Hydrurus*, and *Gloenema*. In the third part (1831) he gave the genera *Gomphonema*, *Styllaria* (=*Podosphenia*, Ehr.), *Meridian*, *Licmophora*, and *Frustulia*; in the last part (1832) *Isthmia*, *Odontella*, *Desmidium*, *Achnanthes*, *Striatella*, *Fragilaria*, *Grammonema* (belonging to the *Desmidieæ*), and *Melosira*. (Kützing was wrong in referring Grammonema to Desmidieæ. This form is probably an imperfectly siliceous Fragilaria, and it is, moreover, a marine species.—F.K.) In the whole the author describes about 116 species of Diatomaceæ. Greville had already described (1827), in the "Scottish Cryptogamia Flora," vol. v., the genera *Exilaria*, *Monema*, and *Berkeleya*.

In 1828 Turpin founded the genus *Surirella*, and Gray, in 1830, the genus *Biddulphia*, from *Conferva Biddulphiana* and *C. obliquata* of the Eng. Bot. Thus, till the year 1832, stood the systematic labours on these microscopic organisms, most of the writers mentioned considering them partly as animals (the moving forms) and partly as plants (the fixed forms). Agardh, Lyngbye, and Leiblein advocated decidedly their vegetable nature; but, beside Schrank, there was none who decidedly advocated their animal character; of their life-history nothing was known beyond the thorough communications of Nitzsch, and the more superficial observations of Gaillon, that might have brought the question as to their nature nearer solution.

In the same year (1832) appeared the second "Contributions to the Knowledge of the Minutest Organisms," by C. G. Ehrenberg. In this the Diatomaceæ were considered as decided animal forms, and were included with the infusoria under the family of "staff animals" (Stäbthierchen, including Desmidieæ); in the class of "stomach animals," (Magenthiere). But, at that time, stomachs were as little recognized by the author as mouth, entrails, or rectum; but a bivalve shell and a changeable foot (veränderliche Sohle) (like the Gasteropods) and said to stretch out the longitudinal cleft of both valves, was mentioned. Another communication from the same author followed in 1834, in which were described sixteen newly observed forms. The descriptions communicated in these observations are of the greatest importance, and are given with a care hitherto unknown in this field. The author had this advantage over his predecessors, that in his investigations he could make use of the best microscopes. (The best microscopes of this period probably did not equal in performance such as may now be obtained for four or five pounds. In 1834 Messrs. Goring and Pritchard published the "Micrographia," in which is a dialogue between Tobias Oldbuck, Esq., naturalist, and Mr. William Putty, optician, on the comparative merits of the old-fashioned simple microscope and the newly-invented engiscope (or aplanatic microscope), the performance of metal reflectors (amician reflecting engiscope), and achromatic objectives are also discussed.—F. K.)

Within *Navicula Amphisbæna* he considered the coloured substance as an ovary, and took the lighter cysts appearing therein as polygastric stomach-sacs.

In the year 1838 appeared the great work by Ehrenberg "Die Infusionsthierchen als vollkommene Organismen," in which he still adhered to the animal nature of the Diatomaceæ, and fancied he saw openings or mouths, stomach-cells, sexual organs, and foot-like projections. The filamentous forms he compared to Polypi stems.

Since the first attempts to bring the Diatoms into several genera, the outward form of the shell-covered body, the manner in which the single individuals are united, and the presence or absence of stipes whereby they are attached, have been principally taken as the foundation of classifications since Ehrenberg introduced also the presence or absence of shell-openings for the distinction of genera; but the main groups were arranged according to the presence or absence of stipes, a mistake which caused the author to mention Lyngbye's *Diatoma arcuatum* not only as two different species, but also under two different genera, viz. as *Tessella catena*, and *Striatella arcuata*. His 154 species, contained in the work already mentioned, are mostly accompanied with very carefully drawn figures. In 1839 he published, in the Proceedings of the Berlin Academy of Sciences, "The Formation of the European, Libyan, and Arabic Chalk Rocks, and the Chalk-marl from Microscopic Organisms." In this communication he described the new genera *Coscinodiscus* and *Dictyocha*. [The latter genus is now removed from the Diatomaceæ, with which it has no affinity.—F. K.] In 1840 Ehrenberg discovered that many of the fossil forms were still living in sea-water (also published in the Proceedings of the Berlin Academy). He also published the new genera *Amphitetras*, *Ceratoneis*, *Grammatophora*, *Lithodesmium*, *Podosira*, *Triceratium*, *Tripodiscus*, and *Zygoceros*. In the same year a further communication contained a description of about 100 new species; and the genera *Amphipentas*, *Campylodiscus*, *Discoplea*, and *Himantidium*. He also published, in 1840, his work on the extent and influence of microscopic life in North and South America. Professor Bailey had already, in 1838, given the outlines of American Bacillariæ in Silliman's "Journal of Science and Art," and had also especially reported on the fossil forms of North America.

Ehrenberg received abundant material from North America, and at the same time he received contributions from South America through his brother, Carl Ehrenberg. He also obtained earth from various parts of the Continent, which was brought to Europe in the transportation of lumber (*Pflanzen-transport*), so that he obtained a view of the forms from forty-four different localities in America, from the Falkland Islands to Kotzebue Sound.

In the same year in which Ehrenberg's great work on the Infusoriæ appeared, A. de Brebisson had diligently studied the Algæ of his neighbourhood (Falaise), the results of which he published in his "Considérations sur les Diatomées," in which he introduces the genera *Cymbophora* and *Epithemia*.

About this time Greville (in Hooker's "British Flora") and Harvey (in the "Manual of British Algæ") became co-workers among the Diatomaceæ. The latest discoveries appeared to have been quite unknown to them; at least, they have no influence on their labours.

Ralfs has furnished the most recent work on British Diatoms in a single monograph, which is printed and accompanied with figures in the twelfth vol. of "Annals and Magazine of Natural History."

Ralfs excels his predecessors in the correctness of his descriptions; but his figures are mostly crude (with the exception of those of *Amphitetras*, *Biddulphia*, and *Isthmia*).

F. K.

CHAPTERS ON CUTTLES.

No. 3.

By W. H. Booth.

We have now arrived at the last family of section B, the *Spirulidæ*. The little Spirula, or Ram's-horn, is a shell familiar to most of us, though we may not be acquainted with the animal that formed it. Many of these shells are brought by the Gulf Stream and strewed along the coast of

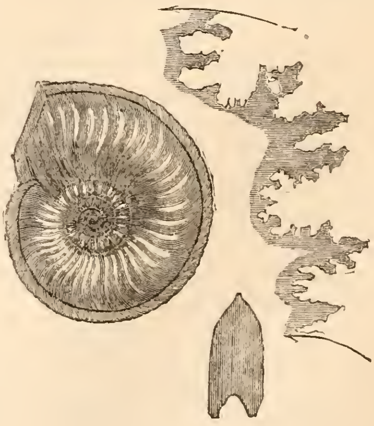


Fig. 20. *Ammonites amaltheus*, showing foliation of chambers.

the Peninsula, whilst a few find their way to our own coast. For a long time the animal to which this shell belonged had not been discovered, and it was generally supposed that it was an exterior shell very much like that of the Nautilus in its function. Such, however, was found not to be the case, for a living specimen was lately procured by Mr. Percy Earl on the coast of New Zealand, which proved that in this cuttle the shell is contained within the mantle, and is in no part external. There are three different species of Spirula, differing from each other but slightly; they are all divided into separate chambers connected by a siphuncle.

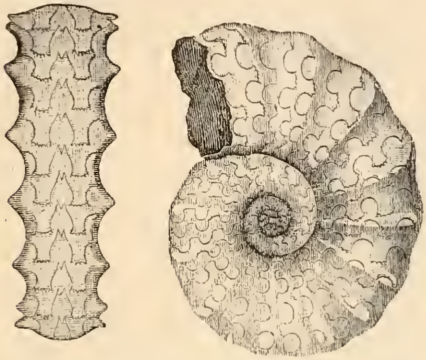


Fig. 21. *Ceratites nodosus*, from the Muschel-Kalk limestone, showing lobed chambers.

We now come to the second order of cuttles, the *Tetrabranchiata*, or "four-gilled." The animals of this order are all protected by an external shell, they progress in exactly the same manner as other cuttles; but their arms, which are very numerous, are not furnished with suckers. Three families only, the *Nautilidæ*, *Orthoceratidæ*, and *Ammonitidæ*, are contained within this order, many hundred dif-

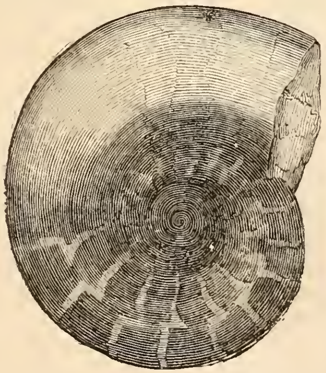


Fig. 22. *Clymenia*, from Devonian limestone, showing zig-zagged chambers.

ferent species of shells belonging to these three families are known, but of these three only are recent, all the rest being fossils. We are all well acquainted with the shell of the Pearly Nautilus (*Nautilus pompilius*), which will serve as a type for its family. The shell of a Nautilus, when cut into two halves, appears to be divided into a number of cells (*septa*), which are connected by a small tube, the siphuncle. All the four-gilled cuttles have shells similarly partitioned off, although in some the shell is straight, in others only slightly spiral, and others often coiled. The Nautilus is furnished with a number of tentacles, which are of two kinds, those about the mouth being of a different description to those which serve as arms. It occupies the front cavity of the shell, and can shut itself in by means of two arms, to which is attached a leathery sort of hood corresponding to the operculum of some univalves. The other chambers which do not contain the body of the animal, but are connected with the heart by the siphuncle, which contains a membranous tube exactly fitting all the cavities, are used to float the animal. Although water could not gain access to the cavities, because the entire circumference of the mantle in which the siphuncle originates is firmly attached to the shell by a horny girdle quite impenetrable to any fluid, yet it is supposed that the chambers can be filled with a liquid from the pericardium, which compresses the air already contained in them, and so the centre of gravity is changed. By thus, so to speak, shifting its balance, the Nautilus rises to the surface or sinks down to the depths at will. Owing to the paucity of living specimens examined by scientific men, but little is positively known about the habits of the Nautilus. Mr. G. Bennet, I believe, was the first man of science who had the good fortune to obtain a living specimen. This gentleman was in Mare Kini Bay, near Erremanga, when a Nautilus was seen not very far from the ship, floating on the surface of the sea with the upper portion of the shell raised above water, and kept in a vertical position by means of the included air, and, in the words of the sailors, looking very much like a dead tortoise-shell cat in the water. On being captured the upper portion of the shell got broken by the boat-hook, as the animal was just sinking when caught. The shell is so well known that a description of it would be superfluous; but a few remarks on its ingenious structure, formed so as to resist the great pressure it would have to encounter when at the bottom of the ocean, may be of some interest. The shell is constructed in every way on the principle of the arch, so as to offer the greatest resistance to pressure, by making each part bear its share of the weight. In some fossil species the strength of the shell is greatly increased by its being formed into ribs, thus fortifying it in a man-

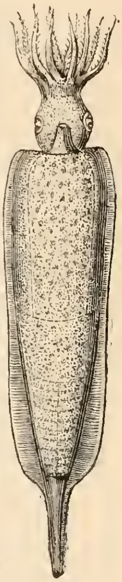


Fig. 23. Ancient *Belemnite*, (restored).

ner similar to that by which iron is strengthened by being corrugated. And, last of all, the divisions between the chambers serve as supports, acting as cross-beams, and enabling the shell to resist all lateral and inward pressure. Probably more of the living animals have been lately observed, as they are by no means rare in the Indian seas, their favourite haunts being along the coral reefs. The Fiji Islanders are said to catch them by letting down large wicker baskets of the same construction as ordinary crab-pots, baited with crayfish, and loaded with stones to make them sink. After catching the Nautili they broil them, when they are reputed to be very good eating.

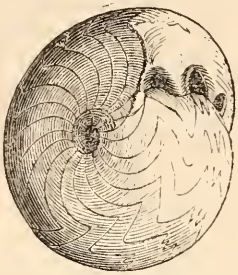


Fig. 24. *Goniatites sphæricus*, from Carboniferous formation, showing angulated chambers.

Of the second family, the *Orthoceratidæ*, we have no examples, save in the fossil state. In the typical genus, *Orthoceras* (ὄρθος, *orthos*, straight, and κέρας, *keras*, a horn), the shells are straight, and, as their name implies, very like a straight horn. Like the Nautilus, these shells are multilocular, and have their chambers separated by transverse plates, concave externally, convex internally, and connected by a siphuncle. Some species of this genus attain to a length of nearly six feet; their shells are found in great numbers in blocks of marble of a dark-red colour, from the limestone of Oeland. Of this marble many pavements of our public buildings have been constructed; amongst them part of that in Hampton Court Palace, and that in the Hall of University College, Oxford. Several other genera belonging to this family possess shells of very pretty and varied forms; of these, the genera *Cyrtoceras* and *Gyroceras*, are good examples. We now reach the last family, the *Ammonitidæ*, containing the well-known Ammonites and other kindred forms, which must have existed in great numbers during the Secondary epoch, as testified by the number of their shells which have been found. They are very similar to the Nautilus in most respects, and are far too well known to require description. The name of Ammonite is said to be derived from the Romans, who called it the "cornu Ammonis," or Ammon's horn. Another name is that of St. Hilda's beads, so called from a supposition that they were snakes turned into stone at that saint's prayer. The good people of Whitby went farther than this, for they made plaster heads of snakes and fixed them on to the Ammonites; alleging that they were found in that condition. Ammonites are occasionally found of a great size, almost as large as a cart-wheel, and in some parts are so plentiful as to be used for mending the roads. They are very generally distributed, most numerous in portions of the Oolitic system; two species found in England, at Whitby, have also been discovered at an elevation of sixteen thousand feet on the Himalayas.

Fig. 25. *Orthoceras*; the upper part is one of the perforated chambers.

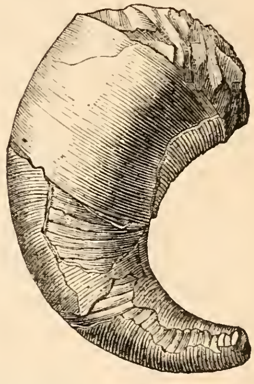


Fig. 26. Curved *Orthoceras* (*Cyrtoceras*).

It now only remains for me to notice a class of shells which, from their structure, might be supposed to be closely connected with the Ammonites and other chambered shells; I allude to the Foraminifera, and more especially the Nummulites. These beautifully sculptured little shells, existing as they do in countless myriads on our coasts, the delight and great pleasure of the microscopist, are of much lowlier rank. They appear to be more closely allied to the *Amœbæ*, animals (very nearly vegetables), nothing more than a piece of mucus, colourless, plastic, and just retaining voluntary motion. When one of these creatures approaches any minute plant or animal that cannot get out of its way, it so contorts itself as to send out branches or arms of its body, which clasp the prey all round, and make it embedded in the living mucus until quite absorbed. Thus, of very much lower organization than the Cuttles are the Foraminifera.

We have taken a cursory glance at the main features of the Cuttles, animals which, from their ferocious disposition and terrible weapons, may fairly rank as the tigers of the deep. Yet we must by no means look upon these destroyers as beings whose absence would leave no gap, or be even beneficial. On the contrary, they are most necessary, and are a part of the scheme of nature by means of which creatures are kept within bounds from excessive increase through counterbalancing causes. It is one of the precepts of Providence that seems strange and revolting at first sight, that throughout all creation there should be such a sanguinary scene as that of the cruel methods by which the carnivorous tribes procure their prey. As it is with the higher mammalia, so is it with these cuttles; the more the difficulties and dangers that beset the existence of an animal, the more are its means of defence augmented. The pursuit of prey forms a large part of the occupation of the Cuttles, as also does flight from their numerous foes. These twofold requirements bring into action a number of accomplishments, so to speak, which, but for their carnivorous nature and that of their enemies, would never have been called into existence. But for the urgent calls for self-preservation, both as shown in flight from enemies and pursuit of prey, a great sameness and inactivity would be visible in all the manifold productions of nature. It was never meant that animals should drag on a miserable existence merely to keep gorging themselves with food. No; under such a state of affairs what would be the aspect the world would present? A number of beings grovelling on the earth with no other care than that of filling their paunches to satiety, and totally destitute of the life and busy activity which is to be seen everywhere around under the present state of affairs. The sudden extinction of all cuttles would also create a great blank in the police of nature; we should have several creatures increasing at such a rate as to become positively baneful. It is interesting to notice the many forms which cuttles possess, all called into being by a felt need. The female Argonauta fabricates a delicate shell wherein her eggs are laid to prevent their being injured by the rapid rush of water or devoured by predacious fishes; the male, having no eggs to protect, does not require a shell, and so has not got one. Nearly all cuttle are provided with a supply of ink to aid them in escaping from their enemies, by rendering the water so dark and turbid that they are not visible. Yet the Nautilus has no ink—and why? Because its mode of protecting itself is by simply retreating within the shell, where it is perfectly protected from all foes by the strong membrane which forms a cover to the mouth of the shell. And we might multiply instances indefinitely, but the few above will show how a variety of powers is called forth by the needs of self-preservation.

THE ANTENNÆ OF INSECTS.

By Mr. T. W. Wonfor.

We copy the report of the following very interesting and instructive paper, recently read before the Brighton Natural History Society, from the *Brighton Daily News*, a paper which has already distinguished itself by the prominence it gives to popular scientific subjects.

Few, if any, organs belonging to the different members of the animal world present such a diversity of form, or have led to so great a difference of opinion among naturalists respecting the special office they fulfil in the animal economy as the *antennæ*, the jointed organs situated on the head in most of the different members of the great family of *articulata*. While the *crustacea* possess two pair, the *myriapoda* and *insecta* are furnished with a single pair only; in the last-named the form, number of joints, and sundry other particulars are used as a means of classifying the different genera and species.

They are generally spoken of as consisting of three parts,—the basal joint, connected with the head by a ball-and-socket movement called the *torulus*, is designated by the term *scapus;* the next portion, generally cylindrical in form and often very minute in size, is called the *pedicella;* while the rest of the antenna is called the *clavola*. That the form is different is evident to all who have examined any class of insects, while the terms moniliform, setaceous, clavate, pectinated, ensiform, plumose, lamellate, &c., indicate the nature of some of these differences; and simply as objects exhibiting diversity of appearance with possible identity of office, they form an instructive series worthy the attention of the microscopist.

Apart from this diversity of form, the antennæ deserve especial attention, because, as before mentioned, it is not yet absolutely determined what is their especial function, or in which part any one of the functions attributed to them is situated.

Different writers have assigned to the antennæ the three several senses of touch, hearing, and smelling, and all adduce illustrations, or the existence of parts in these organs, to warrant their respective views. That they are organs of sensation none deny, but which, or how many of the three senses above named they constitute, is still a moot question, though the microscope in the hand of Dr. Hicks and others has done much in recent days to help to unravel the mystery.

Those who have watched the actions of ants or bees must have been struck with the use made by these creatures of their antennæ, as a means of communicating information to each other. How this information is conveyed, or how they converse, apparently, by the mere contact of their antennæ is certainly not known; but that they do convey information from one to another, ask for help, and give orders, is borne out by the observations of many diligent students of both the tribes.

That in many cases they are admirably adapted as organs of touch or feeling would appear to be the case from the great number of joints, their extreme delicacy, and the easiness of movement in every direction. Many insects, when at rest, fold back the antennæ, so as to conceal them, but as soon as they begin to move, the antennæ are thrust forward, the parts are separated widely, and while in some they are vibrated from side to side, in others, as in some species of wood lice (as observed by Kirby and Spence), they are used as organs of touch. It has been urged that they cannot well be organs of touch, on account of the hard horny character of their outer surfaces, and that this function is performed by another set of organs,—the *palpi*.

Many naturalists incline to the idea that they are the organs of hearing. Now it is generally conceded that in the crustacea, especially the higher ones, the organs of hearing are situated at the base of the long external pair of antennæ, and, as in the case of the crayfish, consist of a hollow cylindrical process, closed internally by a drum or thin membrane, behind which is a vesicle filled with fluid, which receives the termination of a nerve; but the organ of smell, as has been principally observed with crabs, consists of cavities lined with a mucous membrane, situated at the base of the inner pair of antennæ, and protected externally by fine bristles.

Many observers have noticed that, if a noise is made, the antennæ of some insects are turned in the direction of the part from which the noise comes. This has been observed in the case of the longicorn beetles, grasshoppers, and crickets, which, when suddenly surprised by a noise, have been seen to stretch out their long antennæ and stand, as it were, attentively listening for the sound. Rennie mentions a green grasshopper inclining its antennæ to the rustle of a piece of paper under the table on which it was placed, and bending one of them in the direction of the sound.

On the other hand, many circumstances seem to prove that insects possess a very acute sense of smell. It has been observed in "Episodes of Insect Life" that "no flocks of vultures can be directed more unerringly to their revolting prey by its odours from afar than certain insects, such as dung-flies and carrion beetles, whose corresponding office is to assist in ridding the earth of offensive objects." That it is the sense of smell which directs the blow-fly to the deposition of the larvæ is shown by the fact that she has laid them on stapelias, a carrion-odoured hothouse plant, and on silk with which tainted meat had been covered. Equally keen-scented are butterflies and bees; the latter have flown miles in the direction of particular flowers, whose odour had been wafted by the wind, while the former have alighted from a considerable height on their favourite flowers. Then, as is well known to lepidopterists, night-flying moths are attracted from long distances by anointing the trunks of trees with sugar or treacle, and this, we should think, by the sense of smell alone.

Again, as we have stated on several occasions, the males of some species of moths are attracted by the females under such conditions as to lead to the idea that either the sense of smell is wonderfully acute, or that they possess some sense not yet determined by physiologists. Placed in boxes either carried in the coat-pocket, put in a basket, or shut up in a leather bag, the perceptive faculty has been so strong in the male that they have been seen flying over the top of a wood at least 300 yards off. Nay more, we have had them settle upon ourselves when the box containing the female was no longer in the pocket. Our idea is that some of the (to us) imperceptible scent clung to our garment.

Among the authorities inclining to the idea that the antennæ are the organs of hearing are Sulzer, Scarpa, Schneider, Roekhauser, Burmeister, Carus, Oxen, Kirby and Spence, Newport, and Hicks: the last named we have more particularly to refer to presently. On the side of those who consider them organs of smell are Reaumer, Lyonet, Robineau, Desvoidy, Küster, Erichson, and Vogt.

It might be asked—Has the microscope done anything, and if so, what, in solving these difficulties? Newport in 1831 ("Transactions of the Entomological Society," vol. ii. p. 229) found all the joints, except the second, of *Ichneumon Atropos* perforated all round by very minute holes. He observed also tracheæ passing up the whole length of the antennæ, and giving off branches at every joint, and which, as he considered, communicated with the holes in the wall of the antennæ. Of this, though, he was not quite certain. He states that the same structure existed in most setaceous antennæ. E. F. Erichson published at Berlin, in 1847, his "Dissertaito de Fabricâ et Usu Antennarum in Insectis," in which he enunciated these laws: 1st. The wall of the antennæ in insects is by no means solid, but perforated by numerous openings. 2nd. These openings are closed on the inner side by a membrane. 3rd. The openings in the antennæ of different insects are arranged in different ways. He also shows that these openings are never found in the basal joint. He considered the numerous hairs found in the antennæ, between the pores or openings, protected them from extraneous bodies, and that the pores were organs of smell, because, "as the olfactory organs of the higher animals are moist membranes, in order that the odorous particles may be dissolved by the humour secreted, in the same way these membranes perform the same office, are protected by the downy hairs, and kept moist by them." Another reason why he considered them organs of smell was that they are most numerous in those tribes of insects whose scent is acute. Vogt pointed out in 1851 that "if the uniform antennæ are examined with a sufficiently high power, the outer surface of all the divisions, except the articulating joint, is found to be covered with minute punctures, which are closed in at the bottom by a thin membrane that appears to be clothed with numerous hairs. In the antennæ that are not of uniform shape throughout, there is a shaft or style, and these indentations are then found only upon the toothed branches, processes, and feathers of the antennæ, whilst the integument of the shaft is like that of the remaining portions of the body." He further says of them, "We are of opinion that these minute pores, filled with fine hairs, perform a function combining those of smell and touch. Now Dr. Hicks, in two papers read before the Linnæan Society in 1857 and 1859, and published in the 22nd vol. of 'The Transactions of the Linnæan Society,' pointed out that on the whole surface of the third joint of the antennæ of the blow-fly are a multitude of transparent dots, apparently vesicles, which on closer examination are found to be cavities in the wall of the antennæ, filled with fluid, closed in from the outer air by a very thin membrane, and that each little sac is connected with the nervous system by a distinct nerve." There are 17,000 of these perforations on the surface of each antenna in the blow-fly. Besides these, there are about eighty larger sacculated chambers irregularly dispersed, and connected with the nervous ganglia. He points out the existence of similar organs in the antennæ of the different tribes of insects, and comes to the conclusion that they are organs of hearing, because—"1st, they consist of a cell, sac, or cavity filled with fluid, closed in from the air by a membrane analogous to that which closes the foramen ovale in the higher animals; 2nd, that this membrane is for the most part thin and delicate, but often projects above the surface, in either a hemispherical, conical, or canoe-shaped, or even hair-like form, often variously marked; 3rd, that the antennal nerve gives off branches which come in contact with the inner wall of the sacs; but whether the nerve enters or ends in the small internally projecting papilla is very difficult to say. Dr. Hicks considered it impossible that the essential nature of an olfactory organ could be included in such structures, or that odorous particles could pass, first through a membrane, sometimes even spinous, then through a cavity filled with fluid, and thirdly through another membrane to reach the extremity of a nerve, but that they were well suited to the transmission of sound. Notwithstanding the conclusions of Dr. Hicks, we cannot help thinking that one of the functions of the antennæ is that of smell. In those moths which exhibit "sembling," that is, the attracting the males by the female from long distances, not only the shape of the antennæ in the sexes differs in a marked degree, but the pectination in the males is very deep, and the number of hairs is many times greater than in the female, while the organs pointed out by Dr. Hicks are more numerous. This is a good time of year for such members as may feel an interest in the subject to investigate the matter for themselves, and we would advise that not only the method of bleaching recommended for rendering the antennæ more transparent be adopted, but that sections similar to those so admirably made by Dr. Halifax be tried, and so some further light may be thrown, either way, on these organs, though the question whether they be confined to one sense, or whether they perform the office at times assigned to them of common sensation, may not be made out to demonstration. The process recommended for bleaching by Dr. Hicks is one drachm chlorate of potash, one drachm and a half water; mix in a small wide-mouth bottle holding about an ounce; after five minutes add 1½ drachm of strong hydrochloric acid. In this mixture place antennæ, and let them remain from a few hours to a week, according to their nature.

THE GOLD-CRESTED WREN.

By W. H. Warner.

Sheltering one side of the house is a row of the tall, graceful, and swaying spruce-firs (*Abies excelsa*), and here, at various times of the year, but especially in spring and summer, may be seen a pair or more of those extremely beautiful little birds the Golden-crested Wrens (*Regulus cristatus*), the humming-bird of the British isles. This tiny bird is about three inches and a half in length, with plumage of an olive-green, and a pale yellow crown, bordered with black at the top of the head. In the male bird a dash of orange enriches his golden crown, giving him a still further claim to the title of Regulus—a king.

You may see the tiny Gold-crest in the most lonely woods, as well as near houses, but always among trees of the fir tribe, for which it has an especial predilection. And here it hunts for minute insects the livelong day with the greatest industry, disporting itself in all manner of positions. It flutters like a butterfly from bough to bough, peers with its bright eye into every cranny and crevice, hangs head downwards like the restless tits, and is generally so absorbed in its busy search, that it will allow the spectator to approach quite close without its testifying the slightest alarm. So fearless too is its disposition, that I have several times approached within arm's length of it. During the severe weather which ushered in the year 1871, a little Gold-crest came to receive our bounty, and on one occasion fluttered down to my feet with the greatest confidence and trust. When busily hunting for food among the boughs of the pine and the fir, the Gold-crest frequently repeats its shrill call-note, which closely resembles the sharp squeak of the Shrew. Its song proper is a sweet feeble little strain, consisting of a few short notes—tweetie, tweetie! ending in a long-drawn twee! This is repeated while the tiny performer is swaying about on the branches of the fir. It first begins to sing in February (in mild seasons in January) and on till August or September.

At the end of April or the beginning of May, the Gold-crest begins to exercise its skill as a designer and weaver, and in this accomplishment it has but three rivals among the British birds; viz., the Chaffinch, the Goldfinch, and the Long-tailed Tit. Early in May, 1868, I watched the progress of a nest, which was built in a spruce-fir close to this house. Noticing the tiny builders flying about with materials in their bills, I watched them for some time, and at length discovered the nest at the extreme end of one of the fir boughs. The tiny owners worked most industriously, and in the space of a week the nest was completed, and two eggs laid. The nest hung between two small end boughs, to one of which it was attached by ropes of cocoon-silk, and the other was woven in with the materials of the nest. The nest was about four inches and a half in length, and was moulded and woven in the most neat and beautiful manner. It was open above, and the opening abruptly narrowed as it reached the top. The walls were composed of soft green moss and wool, felted together and covered on the outside with the webs of spiders, the cocoons of insects, and a few shreds of bark. The inside was small and plentifully lined with feathers, which near the top were so arranged as to almost hide the opening. In this soft bed the eggs were laid, and from their diminutive size appeared almost lost among the feathers with which the hollow was so plentifully adorned. The eggs were of a delicate cream-colour, with a pale brown zone or band at the large end.

In June the Gold-crest brings out its little family into public life, and they hunt for food in company, resorting frequently in winter to the hawthorn hedges, and often collecting into flocks of some numbers. Selby affirms that this tiny creature sometimes migrates, and says that in October, 1822, after a very heavy gale and fog from the N.W., thousands of these birds were seen to arrive on the seashore and sandbanks of the Northumbrian coasts.

To conclude. Though not an advocate for keeping birds in confinement, having always preferred studying the really wild denizens of the woods and fields, yet in deference to those who hold a contrary opinion, I may as well give a few second-hand hints as to the management of these tiny creatures in the aviary. Bechstein, that great authority on such matters, says that the young Gold-crests may be easily reared if taken *before* they are fully fledged. He recommends as food, meal-worms cut small, flies, ants'-eggs, and wheaten bread soaked in milk: care must be taken to make the latter neither too stiff nor too moist. He also says that insect food is necessary to them and seeds injurious. These pretty little creatures live and thrive well in a warmed and ventilated greenhouse with a small pine-tree in the centre, or a large cage in a moderately warm room.

Kingston, Abingdon.

PARASITIC FLIES.

By this term I do *not* mean the hosts of black flies, sand-flies, gnats, mosquitoes, *et id genus omne*, which try men's patience and temper by sucking their blood; but a still worse "crew," whose mission it is to deposit eggs either upon or within the human body. In these cases it is the larva or grub which works all the mischief. The period of occupancy occurs before the perfect insect comes to light; and therefore man's tenant, in the instances to which I allude, is the grub,—not the fly.

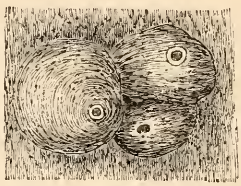


Fig. 27. "Whorbles," or "Worm-holes," in hides of oxen.

The last place perhaps in which one would look for the larva of a flower-fly (I know no better way of rendering the technical name, *Anthomyia*) is the human stomach. Yet at least two species (*scalaris* and *canicularis*) occasionally occupy this singular locality. How can they get there? is the first and most natural question; but one which it is by no means easy to solve. The most probable suggestion is that they are introduced with vegetables which have been standing for some time, and on which the mother-fly has, in the innocence of her heart, laid a batch of eggs, unwitting of the evil consequences likely to follow. But in whatever way they have been brought into their temporary lodgings, they appear to adapt themselves readily to surrounding circumstances, and to make themselves quite at home, clinging to the inner surface of the intestine by means of minute spines with which the back and sides are armed. While there, they cause, as may be supposed, considerable irritation.

The occupation of the Flesh-fly is more legitimate than that of those just named, and the insect seems to be but fulfilling its proper mission when it occasionally assumes the *rôle* of the parasite. It is true, its feeding-ground is more generally the dead than the living subject; still it is not averse, when the occasion offers, to choose man as the nidus on which to deposit its eggs or larvæ (for several species are viviparous), and to rear its young. In

Fig. 28. Grub of *Hypoderma.*

Fig. 29. Flesh-fly (*Sarcophaga carnaria*).

this way it has often caused serious annoyance and even danger to life, laying its eggs in hot weather on wounds and sores, where they speedily hatch, and the grubs, instead of dropping to the ground, eat their way into the flesh. A terrible story is given by Kirby and Spence (Introduction vol. i. p. 137, ed. 4), of a beggar being almost literally devoured alive by the larvæ of flies, attracted by some meat placed by the wretched man "betwixt his shirt and skin."

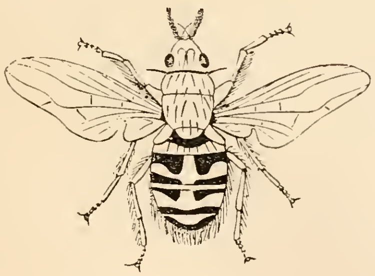


Fig. 30. Blow-fly (*Calliphora fulvibarbis*).

A similar story of a not less painful nature is recorded by M. Aristide Roger, in his "Les Monstres invisibles" (p. 55). It has reference to the death of a chiffonier, who was found a few years ago in a ditch just outside Paris, still living, but with his features completely destroyed by the multitude of blow-fly grubs feeding on him.

Man's perverse ingenuity has converted this propensity of flies to devour living flesh into an instrument of torture; for Plutarch assures us, that in Persia state criminals were sometimes thus punished. For this purpose the wretched individual was fixed securely between two boats, the upper being inverted over the lower, with only the feet, hands, and face exposed; the latter being besides smeared with honey. The result may be imagined. Countless swarms of scavenger flies, attracted by their prey, deposited masses of eggs on the victim, who was thus eaten alive. Persons have been known to live for several days before they succumbed to this horrible torture.

Fig. 31. *Lucilia hominivorax.*

Fig. 32. Grub of ditto.

The principal parasites, at least in this country, are the different kinds of Flesh-fly (*Sarcophaga*, fig. 29) and Blow-fly or Blue-bottle (*Calliphora*, fig. 30), the prolific parent of the "gentles," dear to the heart of youthful Izaak Waltons. Prolific indeed they are! Degeer calculated that a single flesh-fly may deposit about fifty larvæ (for she is viviparous), and in the course of six months may become the happy mother of more than five hundred million descendants! (Lennis, "Naturgeschichte des Thierreichs," s. 620.)

In addition to the above there are two flies, whose habits have not been thoroughly studied; but the effect of whose parasitism is, in one case at least, very serious. They are confined to the warmer regions of America, and are known to the natives under various names: in Brazil they are the Ura; in Costa Rica, the Torcel; in New Granada, the Gusano peludo; in Cayenne, the Ver macaque. With regard to one of these flies, Bates speaks as follows:—"A species of *Œstrus* or gadfly, on the Upper Amazons, fixes on the flesh of man as a breeding-place for its grub. I extracted five at different times from my own flesh. The first was fixed in the calf of my leg, causing there a suppurating tumour, which (being unaware of the existence of this Œstrus) I thought at first was a common boil. The tumour grew, and the pain increased until I became quite lame, and then, on carefully examining the supposed boil, I saw the head of a grub moving in a small hole at its apex. The extraction of the animal was a difficult operation, it being an inch in length and of increasing breadth from head to tail, besides being secured to the flesh of the inside of the tumour by two horn hooks. An old Indian of Ega showed me the most effective way of proceeding, which was to stupefy the grub with strong tobacco-juice, causing it to relax its grip in the interior, and then pull it out of the narrow orifice of the tumour by main force." ("The Naturalist on the Amazons.")

Alexander von Humboldt had already published an account of a fly with similar habits, which he named *Œstrus hominis*. According to his observations, the larvæ of the insect are not rare on the arms, back, and abdomen of the natives, within large tumours, at the top of which is a minute orifice, through which the grub communicates with the outer air. At a fitting period the larva forces its way through this hole, falls to the earth, and there undergoes its final changes.

All this is precisely what occurs in the case of the European gadflies. Every resident in the country must have noticed lumps or swellings on the backs of oxen, especially of heifers, which are called by the rustics whorbles (fig. 27) or wormuls, no doubt meaning worm-holes. Within each of these swellings lies ensconced a grub, the produce of a large brownish fly, which was named by Bracy Clark *Hypoderma bovis* (fig. 28). From August to May the head of the little creature is plunged in a mass of purulent matter, on which it feeds, while the tail, in which the breathing apparatus is situated, is thrust through a minute hole at the apex, in order to come in contact with the outer air. During the month of May the larva manages to enlarge the orifice, through which it drops to the ground and seeks a convenient place of shelter.*

This little bit of life-history points to a close analogy between our gadfly and the human parasite of South America. Moreover, a connecting link is found in a narrative given us by Don Ramon Paez in his "Life in the Llanos of Venezuela," wherein he writes: "Agapito, our host, had an easy time as overseer of this domain, his only occupation being from time to time to scour the savannah in search of young foals which might have been attacked by the 'gusano.' This is the larva of a species of fly deposited in the umbilical cord of the new-born foal, and which, if not promptly removed, will eat into their very vitals."

It will not escape observation that the horse-fly of Venezuela and the human parasite of the neighbouring state of New Granada both pass by the name of Gusano.

On the whole, we can scarcely avoid the conclusion that some species of ox-fly not unfrequently leaves its proper pasture-ground, and deposits its eggs on the human frame. Certainly Van der Hoeven ("Handbook of Zoology," i.) is inclined to think that the injury is due to this cause, or else to some species of *Tachina*.

Other authorities, however, introduce us to a fly whose mode of action bespeaks it a place among the flesh-flies,—a group very far removed from the gadflies.

One species infests the valleys of Mexico, both North and South, though not found on the high table-lands. This fly lays its eggs in the nostrils of human beings; the larvæ are quickly hatched; and then follow rapidly ulceration, erysipelas, and meningitis. The insect gradually eats its way into the mouth, eyeballs, cheeks, &c., until in a fortnight or three weeks the miserable victim succumbs to his fate. ("Archives médicales Belges," 1867.) The same or a similar plague is not uncommon farther south. Captain Burton does not appear to have been himself cognisant of any case in Brazil, but he speaks of hearing "many tales told of negroes losing their lives in consequence of the grub being deposited in the nose and other places." ("Highlands of the Brazils.") A more detailed account I translate from M. Girard's work, "Les Métamorphoses des Insectes," published in 1867. "Since the transportation of prisoners condemned to hard labour to Cayenne has been in vogue, several fatal cases have been traced to the operation of a fly named by Dr. Coquerel *Lucilia hominivorax* (fig. 31). Other convicts have escaped with the loss of their nose; for it is into the nose and cheeks of sleeping men, especially when in a condition of helpless intoxication, that the insect introduces its eggs. The maggot, which is furnished with strong hooked mandibles, establishes itself in the interior of the nostrils, and in the frontal sinus; from thence it passes to the eyeballs, and causes gangrenous wounds in the eyelids; or it enters the mouth, and gnaws away the gums, the palate, and the pharynx, causing intense anguish. The patient experiences at first an itching sensation in the nostrils, accompanied by severe headache and swelling of the nose, which is soon followed by ulceration of the parts affected, during which the larvæ force their way through the skin, and make their appearance on the surface. As the evil advances, violent inflammatory action sets in, with all the symptoms of meningitis and erysipelas, until death releases the victim. The grub in question is known in Cayenne as the *ver macaque*, and was published to the world so long ago as 1735 by M. Arture, physician to the king of Cayenne. It is probable that the *ver moyacuil* of Mexico, which attacks men and dogs, is an analogous species.

"Dr. Coquerel has also made known another fly under the name of *Idia bigoti*, indigenous in Senegal, which stings the soldiers on duty near the coast. In all likelihood this stinging is the introduction of

* No great harm follows from the attacks of the gadfly to our herds; but we are told by Dr. Bernard Altum, in his lately published work, "Forst-Zoologie Säugethiere," that in Germany the hides of the wild deer are often so riddled by these grubs as to render them unfit for the purposes of the tanner.

the animal's ovipositor previous to placing its eggs under the skin. The larva has been met with in tumours in the back, arms, and legs. The negroes are often attacked by this fly, and are skilled in extirpating the larva."

From what has been related, and from the cases of assault quoted by Moquin Tandon in his valuable "Medical Zoology," I infer that at least two species of fly, belonging to distinct groups of the Dipterous order, are concerned in this kind of parasitism. One, an *Œstrid*, to be ranked with the European *Hypoderma*, causes swellings and sores on the legs and arms of the person affected. This is probably the *Cuterebra noxialis* of Goudot. The other, a *Muscid*, nearly related to our Blue-bottle (*Calliphora*), attacks the face of its victim: it is the *Lucilia hominivorax* of Coquerel.—*W. W. Spicer, Itchin Abbas.*

MEDIÆVAL NATURAL HISTORY AND SPORT.*

THIS is a work to cause a student of mediæval history almost to break one of the ten commandments, and so far covet his neighbour's goods. It presents itself in all the attraction of excellent paper and clear type, with fifteen full-page chromo-lithographic prints, and four hundred wood-engravings. The character of the latter may be best judged of by those which illustrate the present notice, and for which we are indebted to the kindness of the publishers. The work is compiled by one of the best-known students of mediæval lore, M. Lacroix, better known as "Bibliophile Jacob," the curator of the Imperial Library of the Arsenal, Paris.

Fig. 33. Cultivation of Fruit; from a MS. of the Fifteenth century.

* "Manners, Customs, and Dress during the Middle Ages." By Paul Lacroix. London: Chapman & Hall.

In the six hundred large octavo pages which make up the volume before us, we have the Middle and Renaissance periods brought before us like a panorama. Their social habits and requirements, their art and science, love and war, homes and prisons, sports and pastimes, are described with inimitable skill, whilst the accuracy of the state-

Fig 34. "Goose Tree," from Munster's "Cosmographie Universelle."

ments are substantiated by the illustrations, which have been derived chiefly from the art-efforts of the periods in question. The pictures very effectively tell the tale, and it would not be difficult to infer from them an accurate idea of the life of six centuries ago, even without the aid of antiquarian

Fig. 35. The Pond Fisherman, from Munster's "Cosmographie," A.D. 1549.

research. The great merit of M. Lacroix's work is that it does not treat of its interesting subjects in a dry-as-dust manner. It is written for the intelligent public, not for antiquaries merely; and the former will thank him for so ably introducing them to the habits and modes of life of their mediæval ancestors. The book is divided into sixteen chapters, of which the most interesting to us are those

Fig. 36. The River Fisherman, from a 16th century engraving.

on the "Private Life in the Castles, Towns, and Rural Districts," "Food and Cookery," "Hunting," "Games and Pastimes," "Guilds and Trade Corporations," "Punishments," and "Condition of Persons and Lands." In fig. 33, we have an illustration of the mediæval mode of cultivating fruit, from which the reader will gather that we have not altered the method very greatly. A little change in the dress and position of the figures employed in pruning the trees, and the picture would stand for a scene in a modern nursery-garden. The illustration is taken from a miniature in the library of the arsenal of Paris. As is well known, Western Europe was exceedingly poor in fruits before the Roman conquests. And although we find from certain statutes of Charlemagne that many of the imported fruit-trees were reared in gardens, no extensive or particular attention seems to have been paid to them until the fifteenth and sixteenth centuries. Of course, the fable of the "Goose-tree," which Mr. Southwell has already described in the last volume of SCIENCE-GOSSIP, makes its appearance in M. Lacroix's pages, as we do not see how it could be kept out. The illustration, however, is of a simple character (fig. 34),

Fig. 37. Whale fishing, from Munster's "Cosmographie."

Fig. 38. Bear Trap, from a 15th century MS.

and tells its own tale as to the supposed origin of Barnacle geese, believed in five centuries ago, not only by the ignorant and untaught, but also by the learned. In fig. 35 we have a pictorial description of the mode of obtaining fish from the ponds. In those fervent Catholic times, the breeding and rearing of fish was an important matter, and all large mansions and religious houses had their fish-ponds. The illustration is a fac-simile of a woodcut from that storehouse of mediæval art, the "Cosmographie Universelle" of Munster (A.D. 1549). The net used by the river fishermen (fig. 36) is identical with that employed in pond-fishing, and the eel-basket seen on the edge of the boat is precisely similar to those still used for eel-snaring in the eastern counties. In the chapter on "Hunting," we get, incidentally, a few glimpses of the natural history of the periods described. We are introduced to animals

Fig. 39. Mode of Catching Woodcocks, from a 14th century MS.

In figs. 39 and 40 we have two of the methods of snaring birds in use during the Middle Ages. Fig. 40 shows a man hidden in an improvised bower of leaves, attracting the birds by imitating their notes on a pipe. The other plan is more ingenious. The bird-fowler was covered with clothes of the colour of dead leaves. When he saw a bird he knelt down noiselessly and kept perfectly still. When the bird was not looking towards him he cautiously approached it on his knees, holding in his hands two little sticks covered with red cloth, which he gently waved, so as to divert the bird's attention from himself. In this way he gradually got near enough to pass a noose, which he kept ready at the end of a stick, round the bird's neck, so as to capture it. This was the usual plan adopted of taking woodcocks alive, as is shown in fig. 39, a copy of a fourteenth century MS.

The brutal pastime of bull-baiting was preceded by horse-baiting, carried on in a similar manner with dogs, as shown in fig. 42, copied from a thirteenth century manuscript. Old horses were those generally utilized for this kind of sport. The sports most popular with all classes were those which entailed torture and suffering on the poor animals which

Fig. 40. Manner of Catching Birds by Piping, from a 14th century MS.

since rendered locally extinct, or exceedingly rare For instance, in fig. 38 we are introduced to a bear-trap, showing how bears were caught and killed with a dart. The profuse hæmorrhage which ensues, shows how effectively the machine has done its work. The illustration is a fac-simile of a miniature in the MS. of Phœbus, in the fifteenth century. The part devoted to bird-fowling is very interesting, as the illustrations prove. Tricks were resorted to that seem to us more of the nature of that infantile fowling operation which consisted in putting a pinch of salt on the tail of the bird, than anything else!

furnished it. Thank Heaven, we are growing out of this degrading practice, and we know of nothing more likely to entirely suppress it than the cultivation of a love and sympathy for animals! In proportion as natural history has increased in popularity, brutal sports, of the kind referred to, have declined in favour.

Fig. 37 introduces us to a busy scene, first sketched in Munster's "Cosmographie Universelle." A whale has been towed ashore, and the blubber is being removed, the work going briskly on to the sound of bagpipes. The naturalist will observe

Fig. 41. Extraction of Metals, from Munster's "Cosmographie," A.D. 1552.

how this then supposed fish is amply provided with mammillary glands! In the back-ground we have incidentally introduced some of the dangers to which the frail whaling-vessels of the time were exposed. An infuriated whale is seen capsizing a ship. In fig. 41 another busy scene is represented, copied from the same work, showing men engaged in extracting metals from the ores. In some of the small washings carried on by miners in Derbyshire on their own account, we have almost the counter-part of this picture.

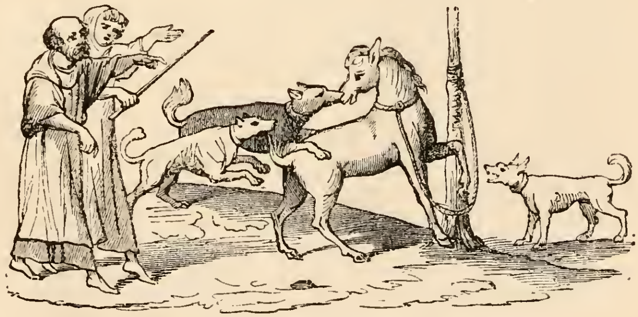


Fig. 42. Horse-baiting, from a 13th century MS. in the British Museum.

Where an outlay of capital is required, and cannot be obtained, it is surprising how long primitive appliances maintain their ground. M. Lacroix's magnificent work is crowded with instances of this kind, and every now and then we come across an outlier that has remained in the same condition for five hundred years at least. We have said enough, however, to indicate to our readers the high merit and general interest of the book we have briefly brought before their notice.

How to Polish Shells.—Having some "green snail" and "Manilla pearl" shells, and wishing to polish them myself, I should be greatly obliged by being informed through your columns as to the best books to be had on the subject of shell polishing.—*Querens.*

A GOSSIP ABOUT RARE PLANTS.

BESIDES the plants I spoke of in a former article, other specialities may well claim the attention of any botanist who makes Anglesea the ground of his rambles. There is *Potamogeton lanceolatus*, which grows in the river Lligwy, a small stream that has its exit near to Moelfra, the scene of the deplorable Royal Charter wreck. This Potamogeton was sent to Sir J. E. Smith by the Rev. Hugh Davies, author of "Welsh Botanology," and was doubtless gathered in the above locality, although Smith vaguely mentions "Lakes in North Wales." After a lapse of more than half a century we find that Dr. Syme (than whom no higher authority can be quoted on such a matter) repudiates all other British localities recorded for this "most distinct" species; and he does not with certainty identify this Lligwy plant with anything known from the Continent or elsewhere; thus rendering our Anglesea locality the sole source of this pondweed. The species stands, in fact, as a pure Welsh (Anglesea) product; and truly it grows in a most "dim sassenach" quarter of the island. Here and there, along the full course of the above-named stream, specimens may easily be obtained and in plenty, but the plant *in fruit* has never yet been met with, so that the fruit remains unknown, although flowers in plenty are produced. Either to procure the fruit, or to show the why and the wherefore of its absence will be appreciated work for a botanist to accomplish.

Long years ago there was found on the Anglesea coast the *Diotis maritima*. The celebrated naturalist John Ray thus mentions its occurrence in his "Synopsis:"—"Gnaphalium maritimum C. B., maritimum multis J. B., marinum Ger., marinum seu Cotonaria Park; Sea Cud-weed or Cotton-weed. We found it plentifully on the sand near Abermeney Ferry, in the isle of Anglesea, where the common people call it Calamus aromaticus." Although in plenty and well recognized when Ray made his itinerary, it does not, as far as I know, occur in subsequent records as having been met with, and Anglesea is now judiciously bracketed with the lost habitats on the south of England coast, as it is not likely that so conspicuous a plant would be overlooked by any botanist. Still, a person in the neighbourhood would do well to institute inquiries and explorations. Personally I have not identified the locality given. Another rare composite, the *Linosyris vulgaris*, or *Chrysocoma Linosyris*, also hails from the Anglesea seaboard, I understand, in some old records, and if so, requires recent confirmation, as it is hardly likely to occur, being a limestone-loving species; the plant has been well authenticated from the not far-distant Orme's Head: whether it is to be found in this latter station *now* is a question I have asked some who have botanized thereabouts, and have been answered with the negative. The attractions of Llandudno have doubtless drawn thither some of the botanical readers of SCIENCE-GOSSIP, who may be able to make an authoritative response, and I shall feel obliged if any can and will do so through your pages.

On the Aberffraw Common, near Llyn Coron, the little *Viola Curtisii* grows in large quantity; it is the same form as that found at Braunton Barrows, further north on the English coast, and is a different form to that which used to grow on the sandhills at New Brighton, and passes under the same name.

Callitriche autumnalis is also a good Anglesea plant, first found by the late Mr. Wilson in the outlet of Llyn Maelog, and this celebrated botanist also discovered the true *Carex punctata* near Beaumaris. In the spring and early summer *Knappia agrostidea*—to give it the best-known title amongst English botanists, of its many aliases,—is common on Aberffraw Common, and *Euphorbia Portlandica, Inula crithmoides, Blysmus rufus, Erodium moschatuum, E. maritimum, Anthyllis Dillenii, Utricularia minor*, &c., are all gatherings the collector will probably appreciate.

Another rarity occurs to me to write a few words about, although it is not in reality a plant of our "Mona," but the history of the plant associates with Anglesea botany. I refer to *Erythræa latifolia*, concerning which so much misunderstanding has arisen, and an Anglesea specimen incorrectly named as such, is the cause of the bulk of the said misunderstanding. The species *E. latifolia* was instituted by Sir J. E. Smith, and we are informed by Dr. Syme that specimens from the neighbourhood of Liverpool are existent in the Smithian Herbarium at the Linnæan Society. It was, no doubt, in one of Smith's several visits to his particular friend, Mr. Roscoe, at Liverpool, during the first decade of the century, that he became acquainted with the plant through Dr. Bostock and Mr. John Shepherd, had it not been for the contrary statement in the "English Flora," namely, that he had never seen the living plant. One would have surmised, from the very exact diagrams assigned to it, that Dr. Smith had both seen and studied it in the growing state, and probably, I should have suggested, under the direction of Mr. Shepherd, who was the then able curator of the Botanic Garden at Liverpool, as he was highly thought of by the doctor, and accompanied him in his botanical rambles during his sojourns at Liverpool. The plant is referred to in the "Addenda et Corrigenda" of "Flora Britannica" (1804), as a marked variety of *E. centaurium*, and it is only in Smith's later work, his "English Flora" (1828), that it is raised to the rank of a species. It had not been included in the issue of English Botany which was published up to 1814 but some short time after the untimely death

Sir J. E. Smith, in 1828 (I say untimely, for his widow is still alive, and attained the somewhile disputed longevity of a century last May—a fact that was duly celebrated), a supplement to Smith and Sowerby's national work was commenced. In the second volume of this supplement, t. 2719, is given us a representation of *E. latifolia;* but it is not *E. latifolia* at all, it is merely a figure of a stunted and unusual-looking specimen of *E. centaurium*, and the specimen from which this drawing was made was, as Sir W. J. Hooker's accompanying text informs us, gathered in Anglesea. Subsequently, many English and foreign botanists, led astray from the true plant by this faulty plate, have been in the practice of calling *E. latifolia*, some abnormal, broad-leaved, squat-growing examples of the common species; and not until Dr. Syme, in the third edition of "English Botany," what I may term *re-established* the true plant, has the confusion promulgated through the blunder I have specified been prevented for the future. The bonâ-fide plant has not been found in Anglesea, and, so far as is known, is still confined to grassy places in the valleys amongst the sandhills north of Liverpool. There, too, it is very uncertain in its appearance and quantity, and it is ten years since more than a few odd specimens have been found. About that time back, I remember the pleasurable satisfaction of coming across a plentiful growth amongst the sandhills, three to four miles south of Southport. Mr. Wilson was in company on the occasion, and he then stated that our find revealed a new plant to him, that it was characteristically different to anything he had met with before, and that he should judge it worthy to rank as a species. I am almost certain, he also said, that he had never been satisfied with the integrity of the English botany plant, which, as I have already stated, was figured from an Anglesea specimen (our culprit above indicated) gathered by Mr. Wilson, himself near Holyhead.

F. M. Webb.

MICROSCOPY.

Sand-blast.—The discovery of the erosive power of sand when impelled with great force against a hard surface, might at first sight appear to have little interest to the microscopist in connection with his favourite instrument. This new power has, however, been made to serve his purpose; as most of the readers of Science-Gossip are probably aware that the impact of sand has been made either slightly to abrade the surface of glass, marble, or other hard substances, or to make deep excavations in them. (I have seen a piece of glass about ⅝ of an inch in thickness with a pattern cut into it nearly ⅜ in depth, and which was done in two or three minutes.) One of the members of the Quekett Club (Mr. H. F. Hailes, of London) makes use of the sand-blast for the purpose of perforating or excavating cells (of various depths and diameters) in the ordinary shape. The former require a disc of thin glass cemented over the aperture, and the cell thus formed can be used for either transparent or opaque objects: the latter are only adapted for opaque objects. For fluid mounting he says, "I find it desirable to varnish the bottom of the cell with 'white, hard varnish,' which obliterates the sandmarks and dries in a few minutes." The cost of the perforated or excavated slips is about double that of an ordinary one.—*F. Kitton.*

Ebonite Cells.—I do not think Micro. Hull will find any cement that can thoroughly be depended on for fastening ebonite cells to glass. I have many objects in my collection mounted in ebonite cells fastened as follows:—I roughen the smooth surfaces of the vulcanite ring with sandpaper, and fasten it to glass with that marine glue which is of about the consistency of india-rubber. I bought some once which was quite hard and brittle, and it did not stick a bit. Lately I have used tin cells, which stick very firmly, and are quite to be depended on.—*U.*

Mounting Leaves of Moss.—"H. W. S." will find the following plan as good as any:—Wash the moss well, drain off superfluous water, lay it on the centre of a slide, and put on a thin glass cover. Secure this with a brass clip, and take hold of the slide with another clip. Now let a little melted glycerine jelly run under by capillary attraction, and boil the slide over a spirit-lamp with a small flame, moving it about so that, being heated equally all over, it may not crack. When cold, all air-bubbles will disappear if the jelly used be not too stiff. Clean the slide and varnish with gold size. I have mosses prepared in this way which have been mounted three years, and the colour has not faded in the least. Glycerine jelly can be bought at any optician's, but if "H. W. S." wishes it, I will send him the recipe by which I make mine. It costs about four times as much to buy it ready-made. I think that the empty fruit-capsules and the peristomes look better in glycerine jelly than when mounted dry, for the colours are better preserved.—*H. M. J. U.*

ZOOLOGY.

Death of Professor Agassiz.—All lovers of natural science will regret to hear that one of the worthiest of its followers, Professor Agassiz, has just passed away. This celebrated naturalist was born in 1807, in the Canton of Vaud, Switzerland. Since 1846 he has been professor at Harvard College. As a geologist he is best known as first propounding the Glacial theory; as an ichthyologist, on account of his celebrated classification of Fishes. Recently he has been engaged in deep-sea explorations along the American coast, and the last object of his attention was the establishment of a large aquarium, on the same principle as that of Dr. Dohrn, at Naples.

GIGANTIC CUTTLE-FISHES.—The Rev. Mr. Harvey has just made a communication to the Natural History Society of Montreal, respecting the occurrence of a huge cuttle-fish a few miles from St. John's, Newfoundland. It was seen by two fishermen, on October 26th, floating on the surface of the sea, and by them was supposed at first to be a portion of some wreck. On reaching it, one of the men struck it with his "gaff," when immediately it showed signs of life, reared a parrot-like beak, with which it struck the bottom of the boat violently. It then shot out from about its head two huge livid arms and began to twine them round the boat. One of the men seized a small axe and severed both arms as they lay over the gunwale of the boat; whereupon the fish moved off and ejected an immense quantity of inky fluid, which darkened the water for two or three hundred yards. The men saw it for a short time afterwards, and observed its tail in the air, which they declare was ten feet across. They estimate the body to have been sixty feet in length, five feet in diameter, of the same shape and colour as the common squid; and they observed that it moved in the same way as the squid, both backwards and forwards. One of the arms which they brought ashore was unfortunately destroyed, as they were ignorant of its importance; but the clergyman of the village assured Mr. Harvey it was ten inches in diameter and six feet in length. The other arm was brought to St. John's, but not before six feet of it was destroyed. Mr. Harvey heard of it, and took measures to have it preserved. It measured nineteen feet, is of a pale pink colour, entirely cartilaginous, tough and pliant as leather, and very strong. It is but three inches and a half in circumference, except towards the extremity where it broadens like an oar to six inches in circumference, and then tapers to a pretty fine point. The under surface of the extremity is covered with suckers to the very point. At the extreme end there is a clustre of small suckers, with fine sharp teeth round their edges, and having a membrane stretched across each. Of these there are about 70. Then come two rows of very large suckers, the movable disk of each an inch and a quarter in diameter, the cartilaginous ring not being denticulated. These are twenty-four in number. After these there is another group of suckers, with denticulated edges (similar to the first), and about fifty in number. Along the under surface about forty more small suckers are distributed at intervals, making in all about 180 suckers on the arm. The men estimated that they left about ten feet of the arm attached to the body of the fish, so that its original length must have been thirty-five feet. A clergyman assured Mr. Harvey that when he resided at Lamaline, on the Southern coast, in the winter of 1870, the bodies of two cuttles were cast ashore, measuring 40 and 45 feet respectively.

CAN ANIMALS COMMIT SUICIDE?—Some time ago this question was raised in the pages of SCIENCE-GOSSIP, and the following paragraph would seem to favour the idea that animals really do sometimes put an end to their own lives.—"A cattle disease of so disagreeable a nature that it causes the animals affected by it to commit suicide, has broken out on the Asiatic shore of the Bosphorus, and has been officially reported at Constantinople. Is is characterized by frothing at the mouth, running from the eyes and nose, a total loss of appetite, great heat, and a thirst so insupportable that some of the beasts attacked by the illness cast themselves headlong into adjacent rivers and streams, and are drowned. The disease, it is stated, has been in existence for upwards of a month in several villages between Beïcos, on the Upper Bosphorus, and Scutari. It attacks bullocks and cows exclusively, and is believed to have been introduced from Ada-Baza, beyond Ismidt."

STENOCEPHALUS AGILIS.—Replying to the remarks of Mr. E. C. Rye in SCIENCE-GOSSIP for January, the words in my paper were upon reference to several, *not all*, published works on "Entomology," for at that time I was fully aware of the valuable one of Messrs. Douglas and Scott on "British Hemiptera." Unfortunately microscopists and naturalists in the country have not that facility of book reference as those residing in the Metropolis. In whatever light Mr. R. may think or fancied I have erred, my simple aim has been accomplished by bringing before the readers of SCIENCE-GOSSIP the structure of "ovipositors" in general: the numerous applications for mounted slides of these organs fully justify my inference.—*J. O. Harper, Norwich.*

BOAR-FISH (*Zeus aper*).—This fish was not long since supposed to be very rare, and the occurrence of a single specimen worthy of note. The ichthyologist placed it among the *élite* of his museum. Now they present themselves by thousands occasionally, as this note will show. Is this owing to emigration to "fresh scenes and pastures new," found necessary in the sea as on our earth, or to the growing interest taken by us in the observation and study of natural objects? "All nature is so full," says Gilbert White, "that that district produces the greatest variety which is most examined." If this fish is stationary on our coasts it is gregarious, and very local in its habits. In December, 1873, thousands of fishes were washed on shore at St.

Martin's, one of the Scilly islands. They were of a sort new to the inhabitants, four or five inches in length, and gave rise to some conjecture. Not only were they wondered at, but experimented on, and found to be excellent eating. The species was identified by Mr. Cornish, of Penzance, an excellent ichthyologist, as *Zeus aper*.—*T. Q. C.*

BOTANY.

Medicago arborea.—Attempts are being made at Brighton to find some shrubs sufficiently hardy and well adapted to bear the exposed spray and winds of the new Undercliff road, but as yet only two (the *Euonymus* and *Tamarisk*) have been found to stand the variations of heat and cold of that spot. Some years back I suggested to Mr. Spary, the Brighton florist, that the *Medicago arborea*, being entirely a seaside plant, though a Southern one, would be likely to stand the climate of Brighton, and he in consequence procured some seeds and raised several plants, which are now grown to large shrubs, and which may be seen in his garden, *green all the year round*, and for the greater part of that time bearing pretty yellow flowers; it is a remarkably handsome and very bushy shrub, and being a seaside plant, and growing so luxuriantly near the sea, it would in all probability thrive on the Undercliff road, not only as a standard, but particularly also if trained up against the cliff wall: it may be seen growing eight feet high against the southern aspect of Mr. Balchin's cottage in his garden at Hove, as also against the north wall opposite; at Florence it forms beautiful hedges close to the sea. The Tamarisk, it will be remembered, was many years back introduced as a seaside plant, and though only indigenous in the south of Europe and along the coast of the Mediterranean, is found to stand the winter and grow freely by the seaside in England, and there is no reason why the Medicago should not flourish there also. I trust that this notice in Science-Gossip may induce the authorities of Brighton, who are expending large sums in planting all over the town, especially on the Undercliff, where nearly all the trees so lately planted there are dead, to try the Medicago there, which, if it succeeds, as I verily believe it will, cannot fail to be an attractive object and a most desirable addition to the shrubs of Brighton.—*T. B. W., Brighton.*

Bark of the Azadiracta indica. — Mr. Broughton has recently communicated the result of an examination of this bark to the Transactions of the Pharmaceutical Society. The *Azadiracta indica* is commonly known as the "Nim-tree," and the use of its bark is very general throughout India, as a tonic and febrifuge. It is generally used in the form of a decoction, and sometimes as a powder. Some authorities state that it possesses the same febrifuge properties as *cinchona* bark. The taste of the bark, and especially that of the inner layer, is intensely bitter. The leaves also have a bitter taste. The seeds yield a large quantity of oil, which has also a strong and bitter taste. The roots are stated to have vermifuge properties. This bitter principle consists of a neutral resin, which may be obtained by exhausting the bark with alcohol. The leaves contain a small amount of bitter substance of a similar nature, but more soluble in water.

Calla palustris in Surrey (p. 277).—*Calla palustris* was originally planted in North Surrey so far back as 1861, and is now quite established. I have no doubt that this is Mr. Gardiner's station. It is also one of the plants recommended by Mr. Robinson for naturalization:—"It is thoroughly hardy, and though often grown in water, likes a moist bog much better. In a bog, or muddy place shaded by trees to some extent, it will grow larger in flower and leaf, though it is quite at home even when fully exposed. Those having natural bogs, &c., would find it a very interesting plant to introduce to them, while for moist spongy spots near the rock garden, or by the side of a rill, it is one of the best things that can be used."—(Robinson, "Alpine Flowers," p. 162.) Its occurrence in Surrey is noticed in the "Journal of Botany," vol. ii. N. S., p. 339.—*R. A. Pryor.*

Fertilization of Flowers.—The *Scrophularia* is, I find, satisfactorily recognized as *protogynous*. In the same connection has any one observed what species of insects haunt the unattractive-looking *Mercurialis perennis?* The female plants too seem very generally to come into flower when the males are almost past blossoming; thus presenting an additional obstacle to their successful pollenization, but are they usually infertile? I do not know whether, as in *M. annua*, male flowers are occasionally intermixed.—*R. A. Pryor.*

Royal Botanic Society.—It may be interesting to notice that specimens of the *Eucalyptus globulus*, described in Science-Gossip, December, 1873, are to be seen flourishing in the Economic House at the Regent's Park Gardens.—*R. H. L. B.*

Changes in the Vegetation of South Africa. —Dr. Shaw has communicated a paper to the Linnæan Society showing the changes which have been caused in the flora of South Africa by the introduction of the merino sheep. He says that the original vegetation of the colony is being in many places destroyed or rapidly deteriorated by overstocking and by the accidental introduction of various weeds. Among the most important of the latter is the *Xanthium spinosum*, introduced from Europe, the achenes of which cling to the wool with such tenacity that it is almost impossible to detach them, and render it almost unsaleable. It spreads with such rapidity that in some parts legislative enactments have been passed for its extirpation; and where this is not done, it almost usurps the place of the more useful vegetation. The President (Mr. George Bentham) stated that the *Xanthium* has in the same manner deteriorated the pastures in Queensland; whilst in the south of Europe, where it is equally abundant, it does not appear to cause such injurious results. Though generally distributed through Europe, the plant is probably of Chilian origin.

Vegetation of Bermuda.—Mr. H. N. Moseley, one of the naturalists to the *Challenger* expedition, has recently communicated a paper on this subject to the Linnæan Society. He states that about 160 species of flowering plants were gathered on the island, but of these not more than 100 were certainly native. Those of West-Indian origin were probably brought, as Grisebach had suggested, by the Gulf Stream or by cyclones, there being no winds blowing directly from the American coast which would be likely to carry seeds, which might, however, be conveyed from the continent by migratory birds. A note by Professor Thiselton-Dyer appended to the paper stated that 162 species sent over by Mr. Moseley had been determined at the Kew Herbarium, of which 71 belong to the Old World, while two, an *Erythræa* and a *Spiranthes*, were plants hitherto known as confined to single localities in the United States.

GEOLOGY.

Mode of Occurrence of the Diamonds in South Africa.—In a paper on this interesting subject just read before the Geological Society of London by E. J. Dunn, the author stated that the diamonds of South Africa occur in peculiar circular areas, which he regards as "pipes," which formerly constituted the connection between molten matter below and surface volcanoes. The surrounding country consists of horizontal shales, through which these pipes ascend nearly vertically, bending *upwards* the edges of the shales at the contact. The rock occupying these pipes was regarded by the author as probably Gabbro, although in a very altered condition. Intercalated between the shale-beds there are sheets of dolerite, &c., and dykes of the same rocks also intersect the shales at frequent intervals. Within the pipes there are unaltered nodules of the same dolerite. With regard to the relation of the diamonds to the rock of the pipes in which they are found, the author stated that he thought it probable that the latter was only the agent in bringing them to the surface, a large proportion of the diamonds found consisting of fragments. At the same time he remarked that each pipe furnished diamonds of a different character from those found in other pipes.

The Mineral Wealth of Virginia. — The recent opening of the Chesapeake and Ohio railway from Richmond, on James River, to Huntington, on the Ohio, and the consequent laying open of a large tract of country hitherto almost inaccessible, has directed much attention in the United States to the resources of a district perhaps the richest and most valuable in mineral wealth of any in America. The railway crosses, at an oblique angle, several parallel belts of useful minerals. Near Richmond is a triassic coal-field long known and worked, though the coal is not first-rate and the expense of getting is considerable. To the west of this belt is a large deposit of iron pyrites, much of it auriferous. Still further west is Charlottesville, where the C. and O. railway is crossed by another of older date, abounding on both sides with some of the purest and finest magnetic oxides of iron known. These ores are very free from all injurious mixtures. A little further west there are several bands, or rather one band presented in several folds of exceedingly pure and rich brown hematites. Parallel with these is another line of railway, partly opened, connecting with the north. After an interval of 100 miles we come upon the coal-measures. The lower part contains a few good seams, but the middle part is exceptionally rich and valuable. There is here about 60 feet of coal in several workable seams, and a thickness of less than 300 yards of measure. The seams are intersected by the deep and picturesque gorge of New River and the Kanawha and reached by numerous tributaries. They can be worked with great ease at small cost, and no coals in the world can be better adapted for the coal-cutting machine. Some of the seams have been opened and are in moderately active work, yielding three kinds of coal,—splint, a hard variety, well adapted for steam and marine engines; cannel greatly valued for enriching gas; and a moderately rich bituminous coal, good for household use, and believed to make excellent coke for iron-making and locomotives. All these minerals are capable of being worked as soon as the coal-fields are open, and it is satisfactory to know that measures are being taken to do this, and that English capital is being diverted in this direction. One English company has already started, and a branch rail is being constructed to enter the coal-seam and carry the mineral to the main line of the Chesapeake and Ohio railway. The coal is here about 150 miles from the iron ore, and iron can certainly be made for a price not exceeding 60s. per ton, either where the ore occurs or where the coal is worked. Besides coal and iron, there are valuable deposits of kaolin and china clay; brine-springs that have been used for a century to make salt; important deposits of corundum used in making emery; exceedingly good mica in large plates, and a great deal of steatite or soap-stone. The development of these minerals is likely before long to alter very materially the relative importance of Virginia and West Virginia among the States.—*D. T. Ansted, F.R.S.*

"MISSING LINKS."—The researches of Professor Marsh in the tertiary strata of the neighbourhood of the Rocky Mountains promise to yield some of the most important results to palæontology that have yet been laid before the public. Most of the generic forms are intermediate connecting groups that are now widely separated, and therefore are to be regarded as veritable "missing links." Among them is a six-horned rhinoceros, that undoubtedly connected the ruminants and the pachyderms. Another interesting form is a small horse, no bigger than a fox. Prof. Marsh is engaged in preparing his already great store of material for publication, although the beds have not yet been half investigated. The investigations had to be carried on at great risk, an account of the Indians.

NEW SPECIES OF FOSSIL DEER.—Mr. Randall Johnson has described a new species of fossil deer in the "Annals of Natural History" for January, under the name of *Cervus latifrons*. He obtained the specimen from the Norfolk Forest-bed. This makes the ninth species which has been obtained from that interesting deposit.

HORNBLENDE ROCKS.—Hornblende rock may in some places be schistose, or nodular, or concretionary. Some of the schistose portions of this kind of rock, from Iar-Connaught, Ireland, have been proved by Forbes to be derivate rocks; consequently such portions must be metamorphosed tuff. Where hornblende rock is nodular or concretionary, it may have spheroids from the size of a man's head to four or five feet in diameter, irregularly heaped up together, with the interstices filled with schistose-looking stuff, that has a foliation rudely curling round the nodules; or the interstices may be occupied with a felsitic rock, or even with a quartzitic stuff, or perhaps with two or more of these substances mixed together.—*Kinahan's Handy Book of Rock Names.*

NOTES AND QUERIES.

A MYTHICAL MAN-EATER.—In SCIENCE-GOSSIP for June, 1867 (p. 128), in an article upon an old natural history more than a century old, I described a strange beast called the Lamia. This creature is said to be bred in Libya; to decoy men to it by exposing its bosom; to have a face and breast like a beautiful woman; and its hinder parts like a goat. This is said to be the creature mentioned as the Lieliath in the 34th chapter of Isaiah and the 4th chapter of Lamentations. So runs the old chronicler. Never having heard of the monster I was amused to read of a legend existing in modern Abyssinia regarding it, which seems to require some explanation, as it is so very circumstantial. Mansfield Parkyns says, in his very interesting work entitled "Life in Abyssinia," published by Murray in 1868 (on p. 404): "There is an animal, which I know not where to class, as no European has hitherto succeeded in obtaining a specimen of it: it is supposed by the natives to be far more active, powerful, and dangerous than even the lion, and consequently held by them in the greatest possible dread. They call it 'wobbo' or 'mantillit,' and some hold it in superstitious awe, looking upon it more in the light of an evil spirit with an animal's form than a wild beast. Their descriptions of this animal are vague in the extreme: some say that its skin is partly that of a lion, but intermixed with that of the leopard and hyena; others, again, assert that *its face is human, or very like it*. It appears in the valleys, happily only rarely; for they say that when it takes its abode near a village, it pays nightly visits, entering the very houses, and carrying off the children, and even occasionally grown-up persons. One had been killed some years ago on the river Weney, and its skin presented to Oubi (king of Tigré); but I could never discover what became of it. I heard of a village which had suffered considerably from its depredations, and for several days watched every night in the neighbourhood, but without success."—*F. A. A.*

SOLUTION FOR PRESERVING SEA ANEMONES.—I find in my note-book the following recipe, extracted from the "Manual of Scientific Enquiry" (p. 361, published by Murray & Co.):—Take bay salt 4 oz.; alum 2 oz.; corr. sublimate 2 grs.; rain or distilled water 1 quart. Place the actinia in sea-water until fully expanded; then add the solution slowly and quietly, when the animal will be killed and fixed in the expanded state. It should then be transferred to a bottle containing fresh solution.—*J. P. Belmont, Dartmouth.*

IPSWICH SCIENCE-GOSSIP SOCIETY.—This flourishing society, founded several years ago by readers of and contributors to our magazine, held its annual conversazione on the 10th December. About 750 of the principal inhabitants of the town were present, who evinced their interest in scientific matters by discussing the various objects exhibited. Among the principal exhibitors were Messrs. W. Ladd, J. Wiggin, B. Edwards, Powles (with a patent sand-blast in full action), Dr. Drummond, Messrs. W. Vick, Howes, Garratt, Budden, and others. Physical science was especially well represented, and natural history by collections of mosses, shells, fossils, butterflies, flint implements, &c. A collection of pictures, by the late Henry Bright, a local artist, added to the variety; and the performances on two of Whight & Mann's magnificent pianos (an Ipswich manufacture) lent a charm to the evening. Great credit is due to the chairman, Mr. W. Vick, and the hon. sec., Mr. Henry Miller, for the successful issue of the meeting.

SHORE-LARK.—It may be of interest to note the occurrence of the Shore-lark (*Alauda alpestris*). The bird, a fine male, was observed in a bird-seller's window in Bristol. The man had it brought to him with several yellow-hammers, caught within a short distance of the city. I had the pleasure of seeing it, and noting its characteristic markings. The yellow head, clongated feathers, aud black patches on top of head, side of beak, and breast being specially prominent.—*E. Wheeler.*

Pine-apples.—At a meeting of the Royal Horticultural Society, held at South Kensington, very recently, I was much interested at some reremarks made by Mr. Liggins, F.R.H.S., upon the great size which the pine-apple attains in the celebrated Pitch Lake of Trinidad. This gentleman's observations are reported in the *Gardener's Chronicle* of December 6th, which also, in a foot-note, quotes Canon Kingsley, from vol. i. of his work "At Last; a Christmas in the West Indies," which corroborates Mr. Liggius' statements. The lake appears to consist of soft powdered pitch and reddish-brown sand. Could not the attention of gardeners be drawn to this (to me) novel cultnre of pine-apples in this country? I seek advice of some practical geologist or chemist on this matter, who, perhaps, wonld be good cnough to recommend some artificial substance, cousistiug of bitumen and brown sand in certain defiued proportions, but which shonld answer all practical purposes of horticulture. It would be an immense boon conferred upon English gardeners, if, by a happy combination of pitch and sand, they should be able hereafter to grow the most luscious of fruits to a much greater size than it has hitherto attained here. I may also remark, that, at the same meeting of the society, the Rev. M. J. Berkeley alluded to some splendid Cayenne pine-apples as having been grown in the Royal Gardens at Frogmore, nnder the influence of heat obtained from oak-leaves (decayed); the plants standing on about six feet of this material.—*John Colebrooke, F.R.H.S.*

The Queen Bee.—Major Munn was the first to put bar-frames *into* (not with) a box or case in 1834, the same as the modern bar-frame hive, which has raised bee-keepiug *to* (not in) such perfection, &c. The fructification of the queen bee is always the death of the drone. (This is what yonr correspondent on p. 262 (1873) wants to know.)—*Wm. Carr.*

A Voracious Perch.—Fishing a short time since in a mill-pool, I hooked a perch weighing three-quarters of a ponnd. Just as I was on the point of landing him, my hook snapped in the middle of the beud, aud the fish escaped. An hour or two after, a friend, who was with me, landed, on the opposite side of the pool, a perch, which on examination proved to be the one I had lost, as we found the broken hook securely fastened in his mouth.—The perch was plump, and evidently a well-fed fish; and the pool, I have no donbt, abounds in food, from the fact that twenty roach taken in one afternoon from the same spot, with the rod and line, weighed, together, over thirty pounds.—*J. Henry Vaughan.*

Musca formiciformis.—This is, I believe, the name of a small fly resembling a winged ant, which I have, now and then, seen in great numbers in hot, dry, summer weather, bnt at no other times. They crowd as close together as they can find room on the branches of low bnshes, and on blades of grass, within the space of a few feet square. They move a good deal among themselves, but do not seem to take wing. They remain in the same spot for many successive days. I have noticed a peculiar odour from them. The plants, on which they stay do not seem at all injured. I should wish to learn more of their nature and habits.—*S.T.P.*

The Snake and the Toad.—One hot summer's afternoon—it was a Sunday in August,—I remember, and a good many years ago—my father called ns all out into his melon-garden. "There was something for ns to see," he said. In a corner of a pit, coiled np and fast asleep, lay a fnll-grown snake, evidently digesting a large meal, for his stomach was enormously distended. A toad, which was kept in the pit to destroy the vermin, was nowhere to be seen.—*The snake had eaten him up!—M. A. Livett.*

The Postal Microscopical Cabinet Club.—In the first box of the Northern circuit of the "P.M.C.C." (Postal Micro. Cabinet Club), Mr. R. Harris Philip, of Hull, inclosed a slide of "Sting of Scorpion," to which he appeuded the following note:—"The 'beastie' from which I prepared this slide was caught by a friend amongst some cotton seed imported from Tahiti. I kept it for abont two months, at the end of which time it died—for want of food, I snppose; for, though I tried it with all kinds of insects (which books say are its nsual diet), yet I could never induce it to eat anything. Indeed, one small larva I put iu, finding the scorpion's back easier for walking on than the sand at the bottom of the jar, nsed to make a regular promenade of it, without molestation, so long as it kept off the head; but Scorpio evidently considered touching his head too great a liberty, and used to project the trespasser to the other eud of the jar with a fillip of the tail, apparently, however, not usiug the 'sting.'" Mr. P. would be obliged to any one who can tell him what they wonld eat, in case he should have the luck to find another. Since sending you copy of rules, which appeared in the December part of Science-Gossip, I have received letters from several gentlemen wishing to join the clnb: these, as we have now our full complement of members, I have been obliged to refnse; bnt have since determined that, after the 1st of January, the president and myself will be pleased to conduct a second club (if agreeable) under the same rnles as our present club. I shall be glad to receive all applications for membership as early as possible.—*Alfred Allen.*

Rara Avis.—During December, 1873, three Hoopoes were observed in the parish of Freshwater, Isle of Wight. One of them was seen by the Rev. C. Bowen, of Heatherwood, Freshwater, to alight under the verandah of his honse. Several years ago a pair of these birds were shot in this neighbonrhood; bnt they have not again made their appearance until the present time.—*A. G. Weld.*

Markings on Lepidoptera.—In reply to J. W. Russell, I cannot find, on reference to Stainton's, Newman's, Wood's, or Morris's works, that there is any difference in the markings between the male and female of *V. Urticæ* or *C. Phlæas.* But in *C. Pamphilus*, according to Morris, the brownish markings at the edge of the wings are darker and more decided in the ♂ than the ♀ specimeus.—*W. L. Sarjeant.*

Signs used to Denote Sex (p. 261).—The sign ♀ has no connection with the goddess Ceres, or her sickle either. Your correspondent will find the whole matter treated of in Mr. Rodwell's "Lectures on the Birth of Chemistry." Suffice it here to say that the sign ♀ is the symbol of the planet Venus, and the corresponding metal, copper, of the ancient planetary worship of the East. It is apparently closely connected with the emblem carried by the Assyrian goddess Astarte and the *crux ansata* of the Eyptians, and the figure itself occurs abundantly among the hieroglyphics of the papyri. It has been thought by some to represent a looking-glass. —*R. A. Pryor.*

Ancient Trees (p. 237). — "On an oak in Hampton Court Park, perhaps the oldest in England, see 'Jesse's Gleanings,' pp. 153-4."—*Flora of Middlesex*, p. 425.

Sucked Eggs. — A friend of mine was looking over a recent number of Science-Gossip, and saw the paragraph headed "Sucked-Eggs," when he informed me that he had discovered a blackbird's nest in a tree in his garden, containing three eggs which had been similarly treated.—*James J. R. Bate.*

Substitute for a Water-net.—I have used occasionally of late, instead of a net of canvas or other material, a metal culinary implement (called, I believe, technically, a small colander), which answers well for securing some insects and larvæ, being fastened to a long handle. Its shallowness is one objection; but the water runs off more speedily from the *débris* brought up, and the metal does not, of course, wear away, while ordinary nets are soon frayed or torn.—*J. R. S. C.*

Euplectella.—Mr. Spicer, in last month's number of Science-Gossip, expresses his surprise at some crustacean having gained admission into the interior of the *Euplectella speciosa*. Attached to the case containing my specimens is a printed description, which states "that the Spaniards in Manilla regard them as formed by the soldier crab, which must take up its place in the tube before the network in the upper end is formed." Whether this is a correct explanation of the formation of this beautiful sponge may be open to grave doubt, but the presence of the crustacean in question would seem to favour the supposition.—*W. R. T.*

The Common Hedgehog.—In your Notes and Queries for November a correspondent, who signs himself "L.," gives some interesting facts respecting a captive female hedgehog, a mother, with four young ones. He states as follows:—"I fear that the mother died from exhaustion, as she suckled her young, and I did not know what to give her except bread and milk." The writer further says, as to hedgehogs, "I should like to know more about their food and habits." Very much has been written as to the food and habits of the hedgehog, but, nevertheless, no writer with whom I am acquainted has at all indicated the amount of sustenance really needed and taken by these comparatively small mammalia; and a delusion prevails, that a very small quantity of food, a few slugs and beetles, will suffice to feed this animal. The Hedgehog belongs to the order *Insectivora*, its teeth clearly indicating that its food is entirely of an animal character. Hedgehogs require a large amount of food. In your journal, of two years ago, "L." will find, under the heading Common Hedgehog, a communication signed "J. H., M.D.," in which it is stated that a hedgehog, after an evening meal of six drachms of cooked mutton, actually contrived to capture and devour a redbreast which roosted in a small fernery within the reach of the thorny-backed marauder. I have frequently kept hedgehogs, small and large, and find that they will eat all animal substances freely—slugs, beetles, meat, either fresh or high (so called), also skin, and the softer feathers of birds; and they will take bread or oatmeal soaked in milk, as cats are taught to do. If well tamed, they will come when called to be fed, in the day-light, but they are nocturnal in their habits, from twilight to dawn foraging about, seeking whatsoever feeble or imprudent animal may be captured, or whatsoever animal substance may be found on the ground; and eating in this way they act as scavengers. On account of the nocturnal habits of the Hedgehog, this animal is a capital destroyer of cockroaches. A jackdaw will pick these creatures up with much more activity, but, unfortunately, Jack begins to blink and falls asleep when the sun goes down, so that he is of no use when all is still and dark, and the *Blattidæ* are out seeking their food. I may mention that hedgehogs die occasionally from scrofulous glandular disease. Some years ago I met with a large male hedgehog, which, from some cause, could not coil itself up when alarmed. It shortly died, and on examination I found that the lymphatic glands of the neck were diseased, and that, on account of the great thickness of the skin of the animal's neck, the matter from the glands could not reach the surface of the body, and so discharge itself; hence the poor animal's sufferings and death. In Norway the Hedgehog is named Pin Swin.—*John Harker, M.D., &c.*

A Wasp and Spider Battle.—In last month's Science-Gossip, Mr. Howell mentions having seen a wasp decapitate a brother. A precisely similar circumstance took place in my presence a few weeks since. That spiders are most afraid of wasps I infer from a circumstance I witnessed many years ago. A wasp became entangled in the web of a spider, located in the upper corner of a window when the spider rushed out to secure his prey, and a battle of some minutes' duration occurred, ending in a dear-bought victory by the spider, the wasp falling dead on the floor, and the spider dying a few minutes afterwards.—*A. Nicholson.*

BOOKS RECEIVED.

"Animal Locomotion." By J. B. Pettigrew, F R.S., &c. London: H. S. King & Co.

"Journal of Applied Science." January.

"Popular Science Review." January.

"Monthly Microscopical Journal." January.

"Grevillea." January.

"Land and Water."

"Les Mondes."

"Evenings with the Microscope." By Philip Gosse. London: Society for Promoting Knowledge.

"The Garden Oracle," for 1874.

"Insects of the Garden." By A. S. Packard, jun. Boston Estes & Lauriat.

"Christian Evidence Journal," No. 1.

"The Argonaut," No. 1.

"British Marine Algæ," No. 5. By W. H. Grattann.

Communications Received up to the 12th ult. from—T. B. W.—S. W. jun.—C. B.—C. P.—J. L. L.—C. C. U.—F. H.—A. W. L.—S. T. P.—J. S. jun.—F. T. M.—T. R.—F. B.—W. R. T.—H. M. J. U.—M. B.—H. B. T.—E. C. L.—W. J. B.—R. H.—E. C.—R. H. N. B.—F. W. H.—A. F. B.—E. E.—J. H.—E. F. E.—J. W.—D. H.—T. Q. C.—A. G. W.—J. S.—H. G.—J. A. jun.—J. J. V.—J. A.—F. M.—W. L. W. E.—E. F. E.—A. N.—R. H.—W. C.—J. L. H.—H. E. T.—F. H.—J. E. T.—E L.—M. M.—W. W. S.—W. R. W.—J. R. S. C.—J. G. M.—G. G.—J. H. L.—A. A.—W. L. S.—S. A. S.—J. L. C.—W. O.—H. G.—C. J. W. R.—O. B.—E. S. B.—D. T. A.—T. J. E.—J. D.—R. M. G.—E. D. M.—J. F. C.—C. C. U.—R. H. N. B.—H. C.—K. P.—A. G.—F. I. B.—W. G. P.—W. W.—E. L.—C. P. G.—R. D.—E. B. K. W.—W. A. T.—E. A. H.—R. T.—A. S., &c.

NOTICES TO CORRESPONDENTS.

A. F. Buxton.—*Carbuncle* is the name given to a variety of the precious garnet (*Pyrope*). It belongs to the cubical system, and it is composed principally of silica, alumina, protoxide of iron, with lime, magnesia, and protoxide of manganese. It is found in Bohemia, Saxony, and Ceylon.

H. T. M.—The following are the names of the moths sent:—No. 1. Lesser Broad-border (*Tryphæna ianthina*); No. 2. Large Mallow (*Eubolia cervinaria*); No. 3. Cabbage Moth (*Mamestra brassicæ*); No. 4. Marbled Minor (*Miana strigilis*); No. 5. Small China Mark (*Cataclysta lemnalis*).

John Dawson.—The *Testacella Maugei* is of a dark brown colour, sometimes mottled or speckled with black, red, or white. Its shell is larger and more cylindrical than that of the nearly allied species *T. haliotidea*. The Black Slug (*Arion ater*) is carnivorous, and devours earth-worms. The *Testacella haliotidea* also preys upon the earth-worms, and will follow them up inio their burrows.

W. K.—The name of the Horse-eye Nut is *Mucuna gigantea*, a native of the East Indies, but extensively grown in the West Indies. The Calabar Bean is quite distinct from it, being oblong, round, slightly curved, and of a deep mahogany-colour. The Horse-eye Nut is round, compressed, greyish in colour, with a black band round the margin.—*J. T.*

A. Stormont.—Will you kindly communicate your address to us, as it was not given in your note?

"When the Swallows Homeward fly."—We received several scores of notices of the late stay with us of the Swallows, all testifying to the extraordinary mildness of the present winter up to Christmas. We thank our correspondents for their trouble, and this reference to the number sent will be an apology for not publishing them all!

W. H. W.—Your description of the animal answers exactly to that of the Barbastelle Bat (*Barbastellus Daubentonii*), given in Bell's "British Qnadrupeds." It is well known as a native of France, but only of late years discovered to inhabit this country. It is in the southern counties that one would expect to find it most commonly in England.

W. Bennet.—It is the Pellucid Limpet (*Patella pellucida*), of deeper water habits than the common limpet, and known by its pellucid shell and pretty bright blue lines radiating from the apex.

J. A., jun.—The only trustworthy work on Exotic Butterflies that would come within your means is Hewitson's, published in parts, by Lovell Reeve, at, we believe, 2s. 6d. each.

J. L. H.—Exchanges of Natural History objects are inserted gratis, if not more than three lines in length.

E. L.—You will by this doubtless have seen that the announcement of the Dodo being still alive has been contradicted. It was a bird called by Prof. Owen a "Dodlet."

R. P.—Your sketch is that of the fossil root of the *Sigillaria*, one of the commonest of the coal plants. It goes by the name of *Stigmaria ficoides*.

P. Thomas.—It is the Hair-worm (*Gordius aquaticus*), usually believed by schoolboys and others to be the transformation of horse-hairs by immersion in running water. The larval stages of these worms are usually passed parasitically in insects.

S. A. S.—You had best obtain the volume of Labels for the Herbarium, by Robson, published by Hardwicke, Piccadilly, last year. It is the completest list yet issued, printed on one side for herbarium use. The generic names are, if we remember right, given as you desire.

Belemnite.—For preserving your Gault fossils, first gently brush them with a weak solution of common glue. This will prevent them falling in pieces. Afterwards, when this has dried, brush them over with copal varnish, to produce the shiny appearance you desire. We think, however, you had better omit the latter, as it warms in summer and gets sticky, so that the dust adheres to it.

J. P. Greely.—A correspondent has kindly recommended us the following receipt as an antidote to wire-worms:—Sprinkle the ground well with soot, and then plant it with potatoes; when the potatoes are taken up, the wire-worms should be taken out and destroyed. If this be done for a year or two, the ground will be entirely cleared from them. If the land is heavy and clayey, a heavy dressing of lime, at the rate of 30 tons per acre, will prove beneficial.

Erratum.—On page 13 of last No. of S.-G., and in 22nd line, for "terrestrial," read "arboreal."

E. C.—You will find a note respecting the connection of the Eagle with St. John, offered as an explanation of the "Liver" on the seal of the Liverpool arms, in the February No. of Science-Gossip for 1872. For St. James and the Scallop, and other hagiographical matters, consult Husenbeth's "Emblems of the Saints."

W. L. W. E.—We are very sorry to remark that, though we got your note, the bees have not yet "turned up"!

Original Subscriber.—We are not aware that you can purchase collapsible tubes ready filled with Canada balsam but it is not difficult to get the tubes first and to fill them afterwards. You had best inquire at a good chemist's. The cheap perfumery is sold in the collapsible tubes. 2nd. You had better apply to any good microscope dealer for the material you desire, and we doubt not he will be glad to send you his catalogues. 3rd. For the purpose of studying the dissection of animals, you cannot do better than obtain Hulk & Henfrey's "Anatomical Manipulation." London: Van Voorst. The second edition (just issued) of Davies "On Mounting, &c." (London: Hardwicke) is still cheaper.

EXCHANGES.

Wanted: *Clausilia biplicata, C. dubia*, and *Bulimus montanus*. Offered: *B. montanus, C. laminata, Cyclostoma elegans*, and others.—Miss F. Hele, Ellenslea, Redlands Grove, Bristol.

Phalaris paradoxa, Sisymbrium pannonicum, &c., for grasses in general, particularly of genera *Bromus, Festuca*, and *Panicum*.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

From eighty to a hundred Foreign Land Shells all duly reported, for which should be pleased for Northern English, Irish, and Scotch Algæ.—Henry Goode, 13, Clarence-street, Penzance, Cornwall.

A Stamp Album containing about 650, open to offers.—Address, J. L. Copeman, 12, The Walk, Norwich.

I should like to exchange Bird Skins with some British reader of the Science-Gossip.—Franklin W. Hall, 14, Park-street, New Haven, Ct., U.S.

Wanted, good mounted Injections. I will give Stained Tissue.—Send stamped envelope to Wm. Sarjeant, jun., Caverswall, Stafford.

Wanted, good slides of *Isthmia nervosa*, good Naviculæ, and Cuxhaven Mud Diatoms for first-class Slides.—H. B. Thomas, Boston, Lincolnshire.

Wanted, Storm-tossed Scraps, Marine objects of interest, &c., dried and named. Can offer Slides, Fossils, and other objects of natural history.—E. Lovett, Holly Mount, Croydon.

Wanted, Larvæ of *P. cratægi, C. Davus, E. Medea, L. Sibylla, A. Iris*, and ova of any hairstreak except Quercus, for Microscopic Slides, or other Lepidoptera.—W. L. Sarjeant, 6, Dagnall-park Terrace, Selhurst, Surrey.

Achimenes, Gesnera, and *Euconodium* bulbs, for well-mounted Slides, Diatoms, &c.—Address, 135, St. Owen-street, Hereford.

Bone Sections, long and transverse, Camel, Horse, Ox, Sheep, and Pig, mounted or unmounted, for good Slides or material.—W. Officer, Wilmington, Hull.

Scales of Bream unmounted, for other good objects.—Stamped envelope to Miss Watkins, 15, Union-street, Deptford, S.E.

Microscopic Fungi, *Œcidium rubellum, Œ. urticæ*, Cluster-cups from Coltsfoot, Pilewort, and Goat's-beard, all mounted, for well-mounted objects—Anatomical or Polarizing subjects in preference.—G. Garrett, Harland House, Whersted-road, Ipswich.

I have the following duplicate Nos. in the London Cat. of British Plants:—752, 746, 929, 1036, 1052, 1037, 732, 418, 229, 676, 957, 867, 881, 698, 472, 1165, 187, 425, 1179, 1168, 1234, 897, 180. Desiderata sent on application.—E. A. Hall, Trinity Hall, Cambridge.

Wanted, *Papilio Machaon*. Will give *Pamphila Actæon*.—R. M. Glazbrook, Lower Caversham.

Hair from tail of Indian Elephant (trans-section), part of Wing of Locust, and many other good objects. Shell sections preferred.—Send list to C. C. Underwood, 25, Gloucester-place, Portman-square, London.

Diatoms from Litcham, cleaned.—Send stamp and address to W. White, Litcham, Norfolk. Any material acceptable.

Foraminifera and other Microscopic Shells, and Diatomaceæ well mounted for other mounted objects.—H. Cockson, 24, Rodney-street, Liverpool.

Beautiful Crystals of Spinel Ruby and rough Amethysts, Topazes, and other precious stones, for Microscopic Slides.—G., 20, Maryland-road, Harrow-road, W.

Algæ from the Channel Islands, North and South Devon, and Cornwall, for any or all of the following sea-weeds—good specimens required:—*Callithamnion floccosum, pluma*, and *Brodiæi, Fucus Mackæii, Delesseria angustissima, Phyllophora Brodiæi, Rhodymenia cristata, Punctaria tenuissima, Sphacelaria plumosa, Arthrocladia villosa, Sporochnus pedunculatus, Polysiphonia parasitica* (very fine in Scotland), *Nitophyllum laceratum* (very fine in the Orkneys).—Henry Goode, 13, Clarence-street, Penzance, Cornwall.

MOLLUSCAN THREADS.

BY G. SHERRIFF TYE.

MONTAGU, at the beginning of this century, noticed the habit in *Physa fontinalis* of thread-spinning. He says: "*Physa fontinalis* spins a filament by which it lets itself down from the surface after floating." Later, Mr. Robert Warington* gave an exceedingly interesting account of this thread-spinning by *Limnæa glutinosa*, *L. stagnalis*, various species of *Planorbis* (not named by him), and *Physa fontinalis*. The latter upon one occasion formed a thread so tough that he was enabled to lift the snail seven inches above the surface of the water by it. The author includes in his list of thread-spinners *Neritina fluviatilis*—of this I shall speak further on—and concludes by stating his belief that "all the fresh-water snails are possessed of this power."

Now, after this well-proven fact of spinning, stated upon the authority of so good an observer, you would scarcely expect to find such an observation as this:—"The Physæ, especially *P. hypnorum*, are active in habit, whether swimming foot uppermost, on the surface of the water, holding themselves stationary at different depths in the water, or gliding through it in sudden jerks by an hydraulic action of the foot. By bringing the lateral margins of this organ into contact, the animal constructs a tube for inhaling and suddenly expelling the water either upwards or downwards.[1] Montagu stated, and the statement has been repeated by Jeffreys, that the animal spins a mucous thread for letting itself down in the water and rising again for respiration; but I have not succeeded in confirming this observation, and have great doubts of its accuracy."†

Mr. Reeve does not tell us how he proved his assertion about the "hydraulic action of the foot," and does not seem to have tried to ascertain how they "hold themselves stationary at different depths in the water,"—coolly "doubts" Montagu's statement about the "mucous thread," and does not notice Mr. Warington's observations at all. I may state that a mollusk is only capable of "holding itself stationary at different depths in the water" when attached to a thread, and that no "hydraulic action" of the foot takes place. When a mollusk is forming a thread, the "lateral margins" of the foot are brought together, forming a channel for the natural flow of mucus down the sides of the foot to the tail; thus adding to the thread, which is gradually extended. The existence of a thread may be proved, as stated by Mr. Warington, by passing a rod under the creature, by which means it can be swayed to and fro.

I have taken great interest in this thread-spinning, and long before I had read Mr. Warington's excellent notes I had been observing this seeming phenomenon, and had tabulated the species absolutely seen by myself in the act, and noted the conditions under which mollusks are capable of producing and using a thread.

Let me here explain that the words *thread* and *spinning* are used descriptively, and it must not be supposed that these threads, or the production of them, bear any analogy to the spinning of spiders. In the case of the mollusk the thread is gelatinous—in fact, is formed of the slime of the creature, the process of forming it being, to a certain extent, an involuntary act, although it is used for a set purpose; whereas the spider's thread is silken, and its formation is entirely under the control of the creature. Neither are they to be confounded with the byssal filaments of the *Mytilidæ*, *Pectinidæ*, *Dreissena polymorpha*, &c., these latter being of a fibrous nature, and the product of a special organ.

As members of the order *Pulmonobranchiata*—breathers of atmospheric air—spin and use threads

* *Zoologist*, 1852, pp. 3634-5; 1855, p. 4533.

† Lovell Reeve, "British Land and Fresh-water Mollusks," pp. 150-1. 1863.

oftener than any other of the Gasteropoda, especially the aquatic members of the group, and as their method of using them differs from the *Pectinibranchiata*—water-breathers—we will consider them first.

In order to be better understood, let us describe briefly their process of respiration. On the side of the creature is situated a sac, or branchial chamber, formed by a fold in the mantle, and having an opening outwards, which the animal can open and shut at will. The air in this sac is renewed by diffusion while the mollusk is at the surface of the water, which air oxygenates the blood through the veins, which ramify in an arborescent form over the roof of the cavity. Now it will be obvious to the reader that when this sac is distended with air, the creature becomes of less specific gravity than water; hence it will float, even against its own will, when dislodged from its hold; and, on the other hand, when the air in its branchial chamber is exhausted by natural respiration, or expelled by reason of some annoyance, the creature, becoming heavier than water, at once sinks to the bottom; and on this simple fact hangs the capability of the mollusk to spin an *upward* or *downward* thread.

I have never seen a member of this order *descend* by a thread unless it had first *ascended* by one, in which case it might return upon the same thread. It would no doubt be possible for it to descend by a thread if its air-chamber was sufficiently empty to allow of its sinking; but, atmospheric air being essential to the creature's existence, it very rarely voluntarily descends without a supply, and *never in such a case by a thread*, although it will creep about in the water when the air in its branchial cavity is sufficiently exhausted to allow it to fall to the bottom of the water when loosed from its hold.

As soon as a young Limnæid issues from the egg it appears to be capable of rising to the surface of the water by a thread, its air-sac being no doubt sufficiently charged with air to render it buoyant enough.

The method of anchoring these threads to the surface of water is singular: a minute concavity at the upper end acts like a small boat—of air, and thus sustains the thread.

When one of these mollusks descends by the thread it spun in ascending, it generally carries back the thread with it, gathering it together by a muscular action of the foot, although these threads are sometimes fixed and made to last a considerable time. The longest threads I have seen are those of the Physæ, and I have had in a vessel containing fourteen inches depth of water, a number of them fixed by *Physa hypnorum*, up and down which they were creeping for eighteen or twenty days together. I have no doubt they can extend their threads to a much greater length, say three or four feet; but, owing to some difficulty in constructing a vessel of such a depth convenient for observation, I have not been able to verify my belief.

Permanent threads are kept in position and strong enough for use by the addition of a film of mucus each time a mollusk crawls over them; and I may here explain what I wish to convey by saying that the process of spinning is to a certain extent an involuntary act.

When a snail crawls (either a terrestrial or an aquatic species) it leaves behind it a trail of mucus, which is discharged for the purpose of lubricating the foot in its passage over any surface, and if the continuity of this mucus be not ruptured, we have a thread in all respects analogous to those I am speaking of.

In the case of an aquatic species, this trail of mucus is usually invisible; hence it may be supposed that mollusks inhabiting water do not secrete such a copious supply as their brethren of the land, and that the water itself would act as a sufficient lubricant; but such is not the case, for not only do the bodies of mollusks require lubricating in their passage through water (as in the case of fishes), but the foot especially, in its passage over the surface of any object. This mucus may readily be seen when fresh water is put into any vessel in which mollusks have been kept for a few days, as the bubbles of oxygen then given off by the plants (*Anacharis alsinastrum* shows it well) adhere to the network of mucus which stretches from leaf to leaf, making it plainly visible: of course the change must be conducted gently. The best plan is to lift out a bundle of Anacharis from the vessel in which the snails are, and drop it gently into a vessel of fresh water.

The slugs possess this mucus-secreting property to a remarkable degree; each species produces mucus of a colour and consistency peculiar to itself, some species being provided with an important slime-gland near the tail. This property is essential to their well-being; having no sheltering shell, it serves to keep their body moist and cool in dry weather. Slugs often *suspend* themselves by a thread, but do not use it as a means of *ascent*. The Pectinibranchs, extracting oxygen from the water as it passes over their comb-like gill, are not capable of altering their specific gravity; hence they cannot spin an *upward* thread; but several species, both fluviatile and marine, often *suspend* themselves from the surface of the water or from a floating object, by a thread, but do not ascend by it again. The same remarks apply to the Nudibranchs.

Instances of thread-spinning occur among the Lamellibranchiate mollusca. *Sphærium lacustre* has been observed by the late Dr. Lukis, of Guernsey, to suspend itself below the surface of the water by a filament half an inch in length, the spinning of which occupied the creature three nours. M. Bouchard-Chantereux has recorded that the young of *S. corneum* possesses the same power of spinning a thread. I have myself seen the latter anchor itself by a mucous filament. The uses of these threads to the Pulmonobranchs appear to be:—

1st. They enable the mollusk to reach the surface of the water gently when no other means present themselves.

2nd. It is a much easier method of locomotion.

3rd. It is a much quicker mode of travelling; for if the surface traversed be smooth, as the side of a glass vessel, it will take the mollusk twice the time to creep as to float by a thread, while if the surface be uneven, as the side of a pond or the leaves of a plant, it would be longer still in creeping.

4th. As a great part of the lifetime of the Limnæidæ, especially the Physæ, is spent in floating upon the surface of the water, where they feed upon particles of decaying vegetable matter, this property of thread-spinning seems admirably suited to their requirements.

It enables the slugs to descend from considerable heights, as from branch to branch of a tree, quicker and easier than by the process of creeping.

Among the Pectinibranchs, it enables the snail to reach the bottom gently, instead of falling roughly or suddenly. It serves the same purpose among the Nudibranchs.*

The Sphæridæ, through their capability of climbing and floating, in which exercises they are fond of indulging, especially when young, are enabled to enjoy a more extended range of habitat and food; and when, during their excursions, they desire to rest, this mucus-cable (always short, generally hardly to be spoken of as of any length, but simply a mucous attachment) keeps them safely moored, while, with foot and siphons withdrawn, they take a short period of repose.

Having thus far, I hope, succeeded in indicating the "why and wherefore" of molluscan threads, I will tabulate the species I have seen spin, and those seen by others, commencing with the species that spins oftenest and best, and relate one or two incidents connected therewith.

Pulmonobranchiata.

Physa hypnorum.—As before stated, I have had the young of this species creeping up and down permanent threads for eighteen or twenty days together. In one case, I saw three Physæ and a *Limnæa glabra* upon a thread of the former at one time. Often, when two Physæ meet upon the same thread, they fight as only mollusks of this genus can, and the manœuvres they go through upon their fairy ladders outdo the cleverest human gymnast that ever performed. I once saw one ascending, and when it was halfway up the thread it was overtaken by another; then came the "tug of war"; each tried to shake the other off, by repeated blows and jerks of its shell, at the same time creeping over each other's shell and body in the most excited manner. Neither being able to gain the mastery, one began to descend, followed by the other, which overtook it, reaching the bottom first. Yet they are not always bent upon war, but pass and repass each other in an amicable spirit. One of the most beautiful sights in molluscan economy is to see these little "golden pippins" gliding through the water by no visible means; and when they fight, to see them twist and twirl, performing such quick and curious evolutions, while seemingly floating in mid-water, is astonishing, even to the patient student of Nature's wonders.

Physa fontinalis stands next as a thread-spinner, using the thread in a similar manner, but not so often.

Limnæa glabra, although not using this means of locomotion so often, nevertheless spins well and easily.

L. stagnalis is active when young, but its habit of spinning decreases as it grows older.

L. palustris.—The same remarks apply to this species also, although I have not seen it spin so commonly as *stagnalis*.

L. peregra.—This species has been observed to spin by my friend Mr. R. M. Lloyd, but it very seldom uses a thread.

L. glutinosa, recorded as a thread-spinner by Mr. Warington.

Planorbis complanatus, *P. spirorbis*, *P. contortus.*—These species spin very much less often than the foregoing.

Limax arborum.—M. Bouchard-Chantereux has seen young individuals of this species descend from branch to branch of a tree by a mucous filament, and he supposes this species to be the *Limax fitans*, or spinning slug of some English authors of the last century. Mr. Daniel has also seen this species suspended in couples from the branches of trees during the breeding season.*

L. agrestis uses a thread in a similar manner.†

L. maximus has been observed to lower itself a distance of three or four feet by a thread.‡

Megalomastoma suspensum, inhabiting the West Indies, derives its name from its habit of suspending itself from the branches of trees by a thread.§

* Alder and Hancock, "Monograph of the Nudibranchiate Mollusca."

* Jeffreys, "Brit. Con.," vol. i. pp. 136–7.

† Ibid., p. 135.

‡ Lovell Reeve, "British Land and Fresh-water Mollusks," p. 26.

§ Guilding, quoted by Woodward, "Manual of the Mollusca," p. 209.

PECTINIBRANCHIATA.

Bythinia tentaculata.—This snail suspends itself by a thread, after floating, which is usually attached to the surface of the water.

Rissoa parva is well known to conchologists as a thread-spinner. Mr. J. G. Jeffreys thus pleasantly speaks of it:—"Lying on a rock, by the brink of a seaweed-covered pool left by the receding tide, it is no less pleasant than curious to watch this active little creature go through its different exercises,—creeping, floating, and spinning."

Several other species of Rissoæ spin threads, also *Barleeia rubra*, *Eulima intermedia*, *Cerithium reticulatum*, *Cerithiopsis tubercularis*, and *Pleurotoma nebula*. An account of their different modes of procedure will be found in Mr. Jeffreys's work, under their several headings.

Litiopa, a genus of small mollusks living on floating seaweed far from land, are said to use a mucous filament for the purpose of regaining their station, after having been swept off the weed.* If this be correct, we have a water-breathing mollusk using its thread as a means of *ascent*, after having spun it downwards, a circumstance I have not myself seen. My observation teaches me that these threads are not used by mollusks *against the laws of gravitation*.

With regard to the spinning of *Neritina fluviatilis*. This species is an inhabitant of running streams, and will not live long in confinement. Its structure renders it impossible for it to spin an *upward* thread, as the nature of its habitat alike precludes it, and as it could not float in running water, it could not therefore spin a *downward* thread, as obtains with other members of its order. While making these observations, I do not discredit Mr. Warington's statement, because, although the act of floating is not a normal one with the creature, it might have performed it as mollusks sometimes do,† when placed under circumstances which allow of it, albeit in their natural condition they could not possibly do it; and if it floated, there is no reason why it should not have spun a *downward* thread.

Having kept nearly every British species of the Limnæidæ in confinement on purpose to observe their habit of spinning, and not having seen some species use this means of locomotion at all, others seldom, and some often; some when young but less often as they grow older, and others all their lifetime, I have been led to advance a theory whereby to account for this varied use of these threads. To this end I have drawn up the following table. While writing it, I am sensible of its imperfections; but if it only serves as a nucleus to stimulate other observers of the economy of these creatures to frame a more perfect one, I shall be the more satisfied with my attempt.

* Johnston, "Introduction to Conchology," p. 131.

† For an account of this habit in *Trochus occidentalis*, a deep-sea species, see Jeffreys, "Brit. Con.," vol. iii. pp. 335-6.

I must ask the reader to bear in mind that the time and opportunities at my command for observing their life and habits do not admit of my coming to the conclusion, that, because I have never seen a species spin a thread, therefore it does not do so. On the contrary, I believe that all the Limnæidæ use this method of travelling, more or less; and, doubtless, in their native habitat, when the eye of man is not present to pry into their secrets, these seemingly insignificant creatures perform these their appointed acts, while we, most wishing to see, see them not:—

Planorbis lineatus.†—Inhabiting streams; could not spin a thread in its native habitat. I have not succeeded in keeping it alive long.

Planorbis nitidus,† *P. nautileus*,† *P. albus*,† *P. glaber*,† *P. vortex*,† *P. spirorbis*,* *P. contortus*,* *Limnæa truncatula.*†—Of these species, some spend their lives on vegetation near the surface of ponds or pools, and others inhabit shallow ponds or ditches, which sometimes become dry in summer; hence the necessity for using a thread does not often occur.

Planorbis carinatus,* *P. complanatus.**—Living in the larger ponds and pools where the water is of considerable depth, this capability of thread-spinning often serves them to good purpose.

Physa hypnorum,* *P. fontinalis*,* *Limnæa glabra.**—Inhabiting deep ditches, ponds, or pools, and fond of indulging in subaqueous excursions, the habit of spinning is essential to their mode of life.

Limnæa stagnalis,* *L. palustris*,* *L. auricularia*,† *L. peregra*,‡ *L. glutinosa*,‡ *Planorbis corneus.*†—When full grown, these species, being much larger and stronger than any of the foregoing, are able to traverse more ground in a given time; hence they do not feel the necessity of using a thread so often as the smaller species.

* Species I have seen spin a thread.

† Species I have kept, but not seen spin.

‡ Species seen to spin by others.

HEMIPTERA.

(*Continued.*)

HOMOPTERA.—THE FROG-HOPPER (*Aphrophora spumaria*).

IN last October number of SCIENCE-GOSSIP I drew the attention of its readers to the ovipositor saws and suctorial tubes of the Nettle-bug (*Stenocephalus agilis*), order *Heteroptera*, or "different wings."

From communications received, and numerous applications for mounted slides of ovipositors, from several contributors of this journal, I fancy some little interest has been excited to further investigations of these organs; for that reason I feel induced to give a brief sketch of another order of Homoptera, section *Trissieræ*, genus *Aphrophora*, species *Aphrophora spumaria*.

Fig. 43. Suctorial tube, lancets, &c., seen from beneath, × 120.

This insect, the "Frog-hopper," will probably be of more general interest, for, although so common, it is little known. Many persons no doubt have seen the frothy secretion upon the branches and leaves of shrubs during the summer months, and probably know that it is commonly designated cuckoo-spit, and this, perhaps, is the only idea of many concerning it. This secretion is effected on the larva leaving the egg. It covers itself with a froth, fixing its rostrum into the cellular tissue of the plant on which it is fixed; it draws up a sufficient quantity of sap to cover itself, pouring out a secretion from the organs placed at the terminal portion of the abdomen (this secretion is the spit); but a more careful observer will find, upon breaking it up, a small green larva, with yellow eyes; the insect thus protected passes through its larva of different stages until it arrives at maturity.

Upon subjecting the larva to the microscopic glass, the suctorial tube, lancets, &c., will be seen (fig. 43) composed of the labrum, which forms a jointed sheath for the slender trestle-like mandibles and maxillæ, and also a canal for the passage of the juices upon which the insects live.

In its mature state it is a dull, stone-bodied, inconspicuous insect with awl-like antennæ (fig. 44), from the last joint of which springs a trestle appendage. Posterior legs adapted for springing, the extremity of tibia and tarsus being terminated with tooth-shaped spines (fig. 45).

The elytra when subjected to microscopical examination will be found very beautiful. The groundwork is seen to be made up of cellular tissue or

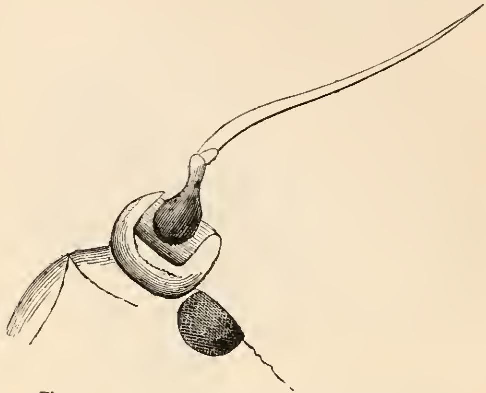


Fig. 44. Head and Awl-like antenna of Froghopper.

oval spots, arranged in irregular transverse rows. These spots are of uniform dimensions,* consisting of a centre, surrounded by a white circle, each spot being divided from its fellow by a space nearly equal

Fig. 45. Posterior leg and terminal claw.

to its own diameter; and, when viewed as an opaque object, stand out in relief. The females are furnished with a singular and beautiful apparatus (fig. 46), by which they are enabled to form excavations or grooves in the twigs or leaves of plants, for the purpose of depositing their eggs (which are large and few in number). It is analogous to the instrument possessed by the Tenthredo or Saw-flies. On the under surface of the terminal segment of the abdomen, nearly at the extreme point, are seen a pair of valves or palpi, which form the sheath for the auger or boring instrument. Upon a casual view this auger appears like a denticulated arrow-headed spear, but on a more minute examination it is seen that what appears at first sight a single instrument, is made up of *four* distinct portions, two deeply indented blades set back to back, and a middle support, in which they slide: the remaining two have their outer edges smooth, but the inner are cut into the most regular minute serrations. These facts are probably known to many; still there may be a few to whom this brief sketch may be in-

* This is more discernible when the elytra is mounted on balsam.

teresting. My only aim is to advise the study of Nature.

On the advantages attending the study of Natural History it is superfluous to enlarge; to every one whose heart is well attuned Nature presents a thousand charms.

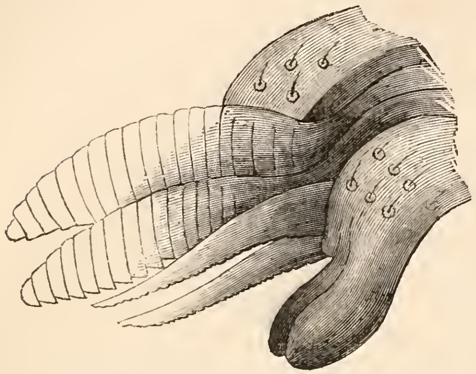


Fig. 46. Saws and Sheath, seen under pressure, side view, × 60.

So various and manifold are the subjects of Nature's empire, that were the life of one man, however zealous he might be, lengthened out to twenty, nay, a hundred times beyond his allotted term, his materials would not be exhausted; he would still have much to study, much to investigate, and, after all, leave a "Systema Naturæ" to be enlarged and corrected by those who should come after him. Hence the great advantage of co-operating numbers, each working in his favourite department, and contributing his portion of labour to the public good.

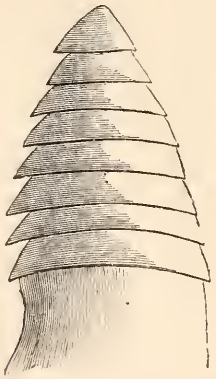


Fig. 47. Upper saw, more highly magnified.

The result is an accumulated mass of riches, which, being transmitted to our immediate successors, may be by them assayed, refined, and increased, and, in due order, passed on to generations following. The utility, then, of selecting a portion of Nature's empire on which to concentrate our energies, is very apparent. We may, nay we must, survey the whole, in order to study a portion to advantage; but while in the one case we content ourselves with a general outline, in the other we follow out the minutest lines, tracing them through all their several curves and ramifications. Every one can, I am sure, do something towards adding to the common stock of information already obtained, even with a moderate degree of attention as opportunity serves. The immense variety of objects which comes under the investigation of a lover of Natural History, so far from discouraging the beginner, should have the effect of stimulating his exertions, as of by far the larger part of "creation" little is comparatively known; nor even of *man* himself can our knowledge be regarded in any way perfect. And none but those who have tried the experiment can form an estimate of the pleasures which arise from this branch of study. There is a simple pleasure in the acquisition of knowledge, worth to many far more than the acquisition of wealth. There is a pleasure in making it useful to others; there is a pleasure in the contemplation of beauty and harmony wherever presented to us; and is not this pleasure increased when we reflect, as in this branch we become experts, that the sources of them are never-ending, and that our enjoyment of them becomes more and more intense in proportion to the comprehensiveness of our knowledge? And lastly, does not the feeling that we are not investigating the acts of human handiwork, but studying the wonders of a creative design, immeasurably heighten the sources of gratification?

Dereham Road, Norwich. J. O. HARPER.

ON MOUNTING IN GLYCERINE JELLY.

SOME of the members of our Postal Micro-Cabinet Club have asked us how we work with glycerine jelly, and as there seems to be no book which gives a really satisfactory method, we ask for a space in SCIENCE-GOSSIP to detail our plan, which, as it is very effective, and though not *quite* original is perhaps new to many, we trust will be useful to those microscopists who mount their own subjects.

This medium possesses the advantage over Canada balsam that, whilst it renders objects transparent, it does not give them that homogeneous and glass-like appearance which, though sometimes advantageous, often leads one to form a very erroneous idea of the nature of the object. Glycerine jelly may be used for almost every class of objects; and it is, we think, easier to manipulate than any other medium now in use.

To begin at the beginning.—The jelly may be bought at most opticians', but it is very easily made at one fourth of the cost. We have found our recipe as below superior to any given in books:—

Soak ½ oz. best amber gelatine (as sold by the chemist or grocer) in 1 oz. distilled water; when it has absorbed all the water, put it in a Florence flask with 50 grains of powdered chloride of barium, warm it in a water-bath and agitate till the barium salt is dissolved. Allow it to cool below blood-heat, and while still fluid add 1 oz. Price's glycerine and a teaspoonful of white of egg; shake until well mixed, replace in the water-bath, and boil at full speed until the albumen *completely* separates from the jelly in the form of a single lump. Now filter through well-washed fine flannel, and it should be as clear as crystal; but if through mismanagement it be a little cloudy, filter it again, this second time using filter-paper, and placing the funnel with the jelly, &c., in a *cool* oven. During the coagulation of the albumen, the jelly must on no account be stirred. It is well to beat up the white of egg before use, lest it should be stringy. In lieu of a water-bath a saucepan may be used; and a little salt thrown into the water causes it to boil at a greater heat.

The jelly made after this recipe is of the proper consistency for entomological objects; but for delicate vegetable structures it should be softened by adding to it a third of its volume of a mixture of equal parts of glycerine and distilled water.

Put the jelly into test-tubes ½ inch in diameter, and when you wish to mount a slide, warm the upper part of the tube; in this way you can pour out any quantity free from bubbles. It is perhaps well to put a trace of varnish or some essential oil on the corks, lest they should get mouldy. The chloride of barium prevents fungi in the jelly: this is the best preservative we know of, but *something* is absolutely necessary. By all means avoid putting alcohol, creasote, &c., in the jelly, as they dissolve varnishes, and also spoil the colour of some objects.

We will now proceed to the mounting operations, and will take an insect for the first example.—Having dissected the fly, or whatever it may be, put the transparent parts (wings, and perhaps halteres) in a little folded piece of cream-laid note-paper with a drop or two of glycerine, *and write the name on the outside*, or you are sure to forget the particular insect which they belong to. Soak the opaque parts in caustic potash solution as usual; boil them once, or if necessary twice, in distilled water, using fresh water each time. The objects may now be mounted at once, or kept in glycerine till wanted, and at the time of mounting rinsed in water to *remove* the glycerine. To mount them, arrange them neatly on a slide, suck away the superfluous moisture through a fine-pointed glass tube; lay on the thin glass cover, and secure with a strong brass clip, or, if the cover be large, use two or more clips. Now drop a little liquefied jelly round the edge of the cover: it will run under, and look too full of bubbles to be good for anything, but that is no matter; just warm it over a small lamp-flame until it boils and the air is driven out, and when the slide is quite cold it will be free from bubbles, or any bubble left near the edge will disappear in a short time. The jelly must *actually boil, but no more*. A great many bubbles will be given off before it really boils, but when the heat reaches a certain point the jelly will burst out from under the cover with a slight noise, and the slide should be taken away from the flame immediately. Every now and again you will get a slide so full of bubbles that they will take a week to go away, and perhaps even a second boiling will be necessary; but this is very seldom. After leaving the slide for a few hours for the jelly to set, clean it with a tooth-brush and cold water, carefully wipe it dry, and cement at once with gold size, of which two or three coats should be applied. India-rubber varnish is perhaps better than gold size for the first coat, for the latter cement sometimes runs in and spoils the object; but if it be only laid on thin enough, this will not often happen. Any varnish containing alcohol is worse than useless, because it will mix with the jelly.

The above plan may be applied to palates of mollusks and all animal objects that are not injured by heat. Injections of course would be spoilt by it. Many vegetable objects, such as wood-sections, tough cuticles, and others of a like nature, may be mounted in the same way as an insect, but delicate vegetable structures and objects in cells must be mounted as follows. Air may be expelled by boiling in water, or, in extreme cases, in alcohol, and *afterwards washing in water*. If that which you wish to mount be such as an alga, you cannot boil it at all, but must merely wash it in clean water, and absorb superfluous moisture with a glass jet.

To proceed.—Drop a little jelly on the centre of a slide, warm it slightly, but not above blood-heat; place the object in the centre; move it gently with a needle to let the jelly penetrate it; lay the cover on quite horizontally—and not one side first, as usually recommended,—and when cold clean and varnish. Cells are *not* often required: only for very thick objects and certain algæ, &c. They may be made of glass, tin, or vulcanite, and should be stuck with marine glue, which is about the only trustworthy cement, or they may be of rings of gold size heated strongly until of a brownish hue. When mounting in a cell, the boiling method is impracticable.

If you wish to use balsam in the same way, after the objects are boiled in water rinse them in methylated spirit, and soak for a time in absolute alcohol; transfer to oil of cloves or carbolic acid (oil of cloves is the better of the two); then lay them on the slide, and mount and boil as above.

For Dammar.—On taking the objects from water, arrange them on a slide with cover and clip, and set it aside till dry; then allow a drop of benzole to run under the cover; about one minute afterwards let the dammar solution run under, and boil out the air as above. Dammar seems to be a rather too fractious medium to use oil of cloves, &c. with, as it is inclined to turn opaque, *especially with alcohol.* The results with balsam and dammar are less satisfactory than with jelly, and bubbles are apt to remain.

H. M. J. UNDERHILL and F. J. ALLEN.

ANCIENT TREES.

THIS subject is evidently one of great interest, judging from the number of correspondents who have contributed information upon it, in your magazine.

Fig. 48. Fortingal Yew.

During a short stay in Wrexham last summer, I visited with our friends the churchyard of Overton, formerly a village, now a town situated in Flintshire, just divided from Denbighshire by the Dee. The churchyard is planted thickly with splendid yews, and from this circumstance forms one of the lesser wonders of North Wales. I send you a sketch of the church and churchyard, copied from the *Art Journal*, May, 1873, but it does not do justice to the trees, which are well worth a minute examination. The yews are of various ages: one very old one I examined was fast going to decay, the trunk was quite hollow, and the cavity large enough to hold several people comfortably. As nearly as I could guess (for I did not measure the tree) its circumference must have been 30 feet three feet from the ground.

Again, there are twenty large yew-trees in the churchyard at Gresford, in Denbighshire; but the noted one mentioned in SCIENCE-GOSSIP for April (1873), is a fine specimen. My brother-in-law walked over from Wrexham recently to examine it for me; he girthed it, and found it measured 29 feet in circumference five feet from the ground; it is more than 60 feet high, and is supposed to be about 1,450 years old, planted in the year 426, when the Romans finally left Britain, Wales being at that time a Roman province.

Both the old sexton and the former churchwarden give a similar account respecting this tree, which several scientific men have been over to Gresford to examine.

In the churchyard of Darley, Derbyshire, there is a very large old yew-tree, which is always a source of attraction to Peak visitors, and is said to be the largest and oldest tree in the kingdom. It measures 33 feet round the trunk, and though bereft of many of its branches, is still in full vigour.

In the churchyard, Tisbury, Dorsetshire, there is now standing an immense yew-tree, which measures 37 feet in circumference. The trunk is quite hollow: it is entered by means of a rustic gate, and seventeen people lately breakfasted in its interior. One in Staines is upwards of 1,000 years old.

The great yew at Fortingal, Perthshire, N.B., alluded to in Mr. Lee's most interesting paper in the December GOSSIP, 1873, page 265, is stated by Gilpin in his "Forest Scenery," vol. i. page 282, to measure 56½ feet in circumference, and is supposed to have been a tree at the commencement of our Christian era. It still remains, and was visited by Mr. Neill, the naturalist, in 1833. This yew is figured by Mr. Strutt.

Many interesting accounts are further given of the yew, in Evelyn's "Silva," and also by Gilpin in his first volume of "Forest Scenery." White, in his History of Selborne, note, page 7, says it is calculated that there are yews in Britain upwards of 2,000 and 3,000 years old.

There are some fine yews round Fountains Abbey, curious in themselves, as well as historically interesting: they are said to have been full-grown when the abbey was built in 1132. (Gilpin, page 280.)

At Hanchurch, near Newcastle, there is a spacious quadrangle formed by many old yews: a church is once supposed to have stood there. Also there is a remarkable avenue of yews at Hales Hall, near Cheadle, Staffordshire, and again some remarkable yews at Himley, Caverswall, and Tixall. The yew was a sacred tree among the Northerns. Its ancient British name was *yw*, or *ywen;* the former (pronounced *yew*) is the plural, the latter the singular; its botanical name is *Taxus baccata.*

Evelyn speaks of a holly hedge in his garden measuring 160 feet in length, 7 feet high and 5 feet in diameter. In Keele gardens, near Newcastle, the seat of the Rev. Walter Sneyd, there is growing a holly hedge 110 years old, 100 yards in length, 6 feet wide at the top, 20 feet wide at the bottom, and 32 or 35 feet high. Speaking of the old trees of North Wales, I must mention that there is a splendid avenue at Wynastery, near Wrexham, upwards of a mile in length, formed of fine oaks, elms, limes, and beeches: one ash, called the "King," measures 36 feet in circumference. There are likewise many fine oaks mentioned in the "Natural History of Staffordshire," page 408, which are worthy of investigation.

It will be with great pleasure I shall look forward to further information upon the subject of old trees in the pages of your magazine.

E. Edwards.

THE DARTER.

(*Boleosoma Olmstedi*, Storer.)

By Charles C. Abbott, M.D.

Not all of our little fishes are "minnows," although a very common want of knowledge of fish generally results in persistently calling everything not a shad or sturgeon, a "little minnie." Now, these ignorant people notwithstanding, there *are* pretty little fish in all of our streams that bear as little relationship to small cyprinoids or minnows, as do these to the bulky sturgeons that visit our large rivers. Among all these little fishes there are none that are more interesting to the field naturalist than the pretty Darters, or Etheostomoids, as we prefer to call them.

In the upper waters of the Delaware river (U.S.A.), where jagged outcroppings of triassic sandstone and smooth glacial boulders dropped here and there in the bed of the stream, make little eddies in the current, and short stretches of smooth sand bottom, just below the bases of such projecting rocks, there are to be found, from June to November, dozens of bright yellow and deep black fishes, narrow-bodied, extravagantly supplied with fins, that vary in length from one inch to five; and it will be noticed, if you approach quietly, that they are always resting upon the sand, or some flat pebble, or smooth projecting ledge of the rock about which they linger. If you disturb them, away they go, with a most laborious movement of all their fins, that send the fish but a yard or two, at most, onward and upward, when they again sink to the bottom; unless a second effort is made to give them an additional "send." Take it altogether, it is the poorest apology for locomotion that we have ever seen in either fur, feather, or fin. Why, actually, if you find them in shallow water, which is frequently the case, you need but follow them up for a little way, and you can run them down. A dozen yards, without rest, tires them out, and they can be caught with the hand.

The most abundant of the several species of this family found in New Jersey is the one we have here figured, the Tessellated darter, *Boleosoma Olmstedi* (*B. tessellatum*, in vol. i. of "Gunther's Catalogue of Acanthopterygian Fishes," p. 77). Although, like all the family, it is a poor swimmer, it cannot be called a sluggish or inactive fish. Its prominent eyes readily spy out wee crawling creatures, that soon escape the notice of the ichthyologist, as he watches the fish before him; and when such minute forms as Etheostomoids largely feed on, do come creeping near, the little "darter" puts his every fin in rapid motion, and pounces down on the unsuspecting object, which it appears never to fail in seizing; and then, with every fin wide-spread, the fish sails off, with stately mien, that is somewhat ludicrous, and settles down quietly, in the spot from which it started, to leisurely devour the morsel it has secured.

Unlike many of the Etheostomoids, the males of this species are not arrayed in gorgeous colours in the spring, but are merely brighter in their tints,

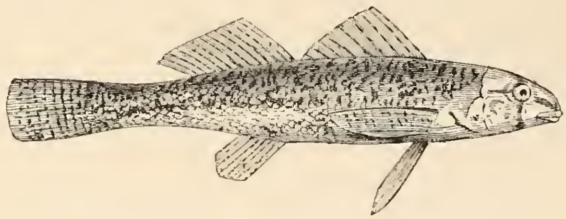


Fig. 49. The Darter (*Boleosoma Olmstedi*).

the yellow and pale brown colouring especially becoming orange, or even red; but, while we have often noticed this deepening of the coloration, and also found many females heavy with ripe and ripening ova, we have not yet one fact to relate with reference to their breeding habits. Just how and where the ova are deposited, we cannot tell; but this we do know, that soon after the 1st of June, *usually*, the darters, young and old, make their appearance, not only in the river, where they are, perhaps, most abundant, but in nearly all our smaller streams, and, selecting such spots as peculiarly suit them, they take up their abode for the summer and autumn, and, indeed, until winter, when they hybernate in the mud, burrowing down to the depth of several inches (?)

There is, perhaps, no species of fish that is found in such a variety of localities as this tessellated darter; and be the bottom of the stream muddy, sandy, stony, smooth, or rough, they find an apparently comfortable habitation, provided the water is constantly changed, and not too warm. So far as our own experience goes, this species will not live in an aquarium, because the water is not in motion, and thereby well aërated; but there are Etheostomoids that are not so sensitive in this respect.

In Science-Gossip, No. 86, we briefly hinted at catching "darters" with a hook and line. This is not a difficult matter, but is rather a slow way of collecting them, if that be the object of capturing them. Like all percoids, darters are certainly very voracious, and will bite at anything, even though unable to seize it fairly, letting alone the possibility of swallowing it. So, if a very small hook is properly baited, it will be readily seized, if dropped immediately in front of and near them. This disposition to snap at everything that presents itself, places these little fish among the scavengers of our streams; for we have noticed that a decomposing fish or other animal, when caught by a projecting rock or stick, will be frequently surrounded by great numbers of these darters, and the carcase will be continually pounced upon and bitten at, until the bones are pretty well picked.

Of the several other species of this family of little fishes, we will not say anything now; but if, in any of our rambles during the pleasant autumn months to come, we succeed in learning something new concerning the tessellated fellow, or in noting peculiarities in allied species, we will again jot down what we have seen, and, perhaps, make a drawing of another "darter."

Trenton, New Jersey, U.S.A.

A CHAPTER ON ANTS.

It is two years since I reported the progress of my formicary, and I intend now to add a few acts which have come across my notice in addition to my observations of previous years. I mentioned in Science-Gossip for 1871, p. 248, the fact of such large numbers of my ants (*Myrmica ruginodis*) escaping suddenly in a body. I thought at the time that my formicary must be very nearly emptied, but in the spring of the following year, 1872, when they woke up from their torpidity, I was pleased to find the colony stronger and of greater numbers than I had expected. They never again attempted to escape in the same manner, but got to look upon their nest as their legitimate home, and would I think have been unwilling to leave it. I often let the trough remain some little time dry before I refilled it, for I found that the stragglers only ran about the stand on which the formicary was placed, but seldom strayed any further.

At one time the glass sides of my formicary got so obscured with moss and rubbish, that the view into the interior was nearly shut out, so I removed them with the purpose of cleaning them, leaving the block of earth standing sufficiently safe. On replacing the glass, since many ants were running over the perpendicular mound of earth in some excitement, unavoidably two or three of them got pressed into the earth, in places where there were no burrows, and were fixed between the glass and the mould, quite unable to move at all. Not long afterwards I was astonished to see several ants with much eagerness running a burrow straight towards the very point where one of these ants was incarcerated. They worked very hard, and after a time they excavated until they reached the imprisoned ant, upon which they pulled away and loosened the soil around it, until they had made sufficient room for it to wriggle out. Having watched the completion of this wonderful sight, I looked to see what was the fate of the other imprisoned ants. I found that there were two other parties of ants eagerly digging out two more of their comrades. They accomplished their object in due time, in one case running their separate galleries from three directions, all meeting at the precise spot where their lost companion was. A fourth ant was lightly pressed against the glass close to the very bottom of the case, and in a very unfrequented part of the hive, at some distance from any burrow, where I expected that he must remain; but the next morning I found a fresh and narrow path leading straight to where he had been, and the ant gone. When the first one of these had been liberated, it naturally seemed weak and stiff after the compression it had been subjected to, and crawled away in a feeble manner; but it was presently met by a companion and then remained motionless, whilst the other began at the head, stroking it all over, round and round, and elaborately pursuing the same course with the thorax and abdomen, feeling down each leg. It looked exactly like a surgeon examining a patient to see the extent of the injuries, and no doubt its intention in doing it must have been something of the same nature. Soon afterwards another ant came up and went through a precisely similar process. Finally the injured ant slowly disappeared out of sight into the formicary, surrounded by several of its companions.

How these ants knew that any of their comrades were incarcerated at all, and how that even then they knew precisely in what direction they should burrow, is one of those mysteries which baffles all conjecture. It shows, however, that they must possess some sense developed to a pitch of great intensity, and though the theory that insects possess a subtle sense unknown to us seems scarcely warrantable, yet it is hard to see which of our five senses, however much developed, would in this case have helped to the discovery of the plight of their companions. If it is the sense of hearing which they have so acutely, it must be modified to their special requirements, for they appeared quite oblivious to any sounds, however loud, which I have made for experiment close to the nest.

At one time my ants collected all the rubbish which they generally threw into the water, as well as a considerable quantity of earth, and piled it together just at the very edge of the platform overhanging the water. They kept steadily adding to it, until it hung halfway across the moat, being kept together by the moisture sucked up from the water below. It really seemed as if they planned bridging over the moat itself; but if such was the case, their design was frustrated by the bridge giving way before it reached the other side. I once cleared it all away, but they forthwith set to work to construct it again as before.

I may mention here, that I should advise the platform being made quite three inches in width from the glass sides to the edge of the bank. When anything unusual occurs to excite the ants they come crowding out, and in their eagerness often slip on the glass and fall down into the trough. They were not often drowned, but were apt to crawl out on the wrong side, and so escape. A wide platform would generally obviate this constant inconvenience. During last summer, I saw an extraordinary contest between a large Daddy-longlegs (*Tipula*) and my ants. The Tipula incautiously alighted upon the nest, and was immediately seized by two or three of his legs by several ants. This was the most exciting of the many battles that I have witnessed in my formicary. The Tipula whirled round and round, striking with its legs in its efforts to free itself from its assailants. They pertinaciously grappled afresh as fast as he shook them off, until at last he got free from them all, with the exception of one, who still maintained its hold. The Tipula then flew away from the formicary; up and down, against the windows and ceiling, and tumbling over and over, but without any effect. The ant kept its hold, and after looking for a long time, I left them to their fate.

Sometimes my ants sucked greedily at a piece of cooked beef, which formerly they used scarcely to touch, and then I noticed that when they have a large and tempting morsel, they continued eating all night without cessation, contrary to their ordinary habits.

Gould mentions that he has fixed threads to a flowerpot in which some ants were confined, reaching to the ground, which they used as means of escape. I have often tried the same thing with my colony, but they took no notice of it.

A large number of young ones were born into the colony in 1872. The eggs from which they sprung must have either been laid before the males and females swarmed, or else a female must have been left behind. In either case fecundation must have been effected in the nest. It is usually stated that the males and females pair in the air at the time of swarming, and that a female returns, or is dragged back to the nest, by the neuters to lay her eggs. My own observations have never borne out this statement, and in this case I know for certain that no female could have returned to the nest after the swarming. With regard to the nests which I have had under my notice, my idea has always been that, the two sexes having fecundated and the eggs being laid, these males and females, there being no further use for them, then leave the nest or are even ejected from it by the neuters. It is very noticeable how carefully the neuters keep the males and females from straying away for a certain period, and when that season has expired relax all their vigilance, and even seem by their eager excitement to encourage and accelerate their departure. During the year I am speaking of (1872) I never saw a single female, and only one small and young male, and I never saw a trace of any swarming at all. The formicary being situated in a constantly used room, such an event could have hardly taken place unobserved by anybody. This year my formicary has come to an end; I find that it does not do to keep one individual colony too long in confinement. They lose energy from always having their food found for them and ready at hand, and get listless from the absence of need for the constant foraging, which forms so considerable a part of the labours of an ordinary out-door nest. Besides this, when two or three generations have been bred up in confinement, they naturally inherit the kind of artificial habits adapted to that peculiar mode of life. My ants ceased to repair damages, ceased from keeping their nest clean and neat, and finally in August I resolved to take it carefully to pieces and see what had been done in the interior of the nest. On doing so I found a comparatively inconsiderable number of neuters, and not a single male or female. The nest was not nearly so universally excavated as I had expected, and there were considerable masses of it with no burrows at all. The principal passages widened every now and then into small caverns, in which the ants were congregated. Right down in the bottom of the nest, in the very centre of the mound of earth, close to the wooden platform at the bottom, I found a large, low, and irregularly-shaped cavity, filled with many ants and also considerable stores of eggs, larvæ, and pupæ. The eggs were little tiny white globules, semi-transparent under the microscope, full of granules, slightly kidney-shaped, and collected together in small compact masses. The larvæ were small white annulated maggots, studded with long and stiff bristles and with large and prominent jaws. The pupæ looked like small white, and soft, perfectly motionless ants with larger heads than ordinary, and with very prominent eyes. The larvæ spin no cocoon. The eggs, larvæ, and pupæ were really piled in this cavern at the bottom of the nest, and there were more ants here than in any other part of the colony. They of course began anxiously to remove and carry about their young when I looked in upon them. It seems to me a remarkable fact, there not being any males or females at all. I have seen no trace of a female since the swarming of August 30th, 1871. I cannot account for the young which I found in the formicary this year.

I have now had ants under my notice in my formicaries for more than three years, and have kept two kinds, *Formica nigra* and *Myrmica ruginodis*. Whether I shall next year start a colony of some fresh species, I do not know; but anyhow my ants have afforded me many happy hours. They are a class of insects intensely interesting, and little understood. In recommending the study to others I cannot give a better motto than Huber gives on the title-page of his "Recherches sur les Fourmis":

"Cherchez, et vous trouverez."

EDWARD FENTONE ELWIN.
Caius College, Cambridge.

THE ANTENNÆ OF LEPIDOPTERA.

THE antennæ of insects are of themselves a study, as Mr. Woufor has shown, and the closer the observation we give them the more charmed shall we be with their diversity of form and tint. Much has been written as to the part these important organs play in the economy of the insect; but hitherto no definite conclusion has been arrived at. My own opinion is that they are employed as a means of communication. I have frequently seen beetles strike one another with their antennæ, causing sometimes a great ebullition of wrath, at another time a rush together in one direction, or a simultaneous attack on a foe. Though, after all has been said, they may be endued with a sense altogether unknown to us. But leaving the strictly scientific portion of the subject to abler pens, my desire in the present paper is to draw attention to the great and varied beauty of these adornments of creatures, perhaps the most lovely in the whole kingdom of nature. "Quis enim eximiam earum pulchritudinem et varietatem contemplans mira voluptate non afficiatur?"

One of the characteristics by which the Papilionidæ are to be distinguished from the Heterocera is the antenna, the former, with but few exceptions, having a knobbed extremity, which is wanting in the latter, and being incapable of folding them under the wings, or of much flexibility. Although butterflies do not present us with such difference of antenna-form as moths, a strict examination will detect a great distinction between the several families. Those of the Purple Emperor are the longest, and the tapering of the club in this species is exceedingly graceful. The ringed antennæ of

Fig. 50. *Deilephila Galii*, showing uncinate antennæ.

the Lycænidæ are very pretty objects. Considering its size, the Swallow-tail—the largest of English butterflies—has them very short. This is a distinctive feature of the Rhodocerid æ and Pieridæ. In the Hesperidæ, Paniseus, Comma, and Sylvanus have hooked antennæ, a character in British insects confined almost exclusively to the Heterocera; but existing in many exotic species of butterflies. In some of the older works on entomology this little family was omitted altogether in the Papilionidæ.

Having thus rapidly glanced at the antennæ of

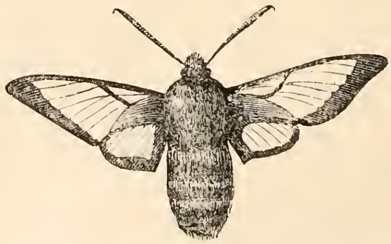


Fig. 51. *Macroglossa fuciformis*, showing uncinate antennæ.

butterflies, we will proceed to those of moths; and here, as the scientific name given them by Boisduval implies, the variety of "horns" we shall meet with will be very great. They may be divided into three kinds: the filiform or simple, uncinate or hooked, and the plumed or pennate: they have furthermore been called pectinated, ciliated, serrated, and pubescent. The Sphingidæ will furnish us with instances of uncinate antennæ, those of Atropos being the most prominent examples; but the silvery white of Ligustri and the delicate pink of Porcellus are the most beautiful in this group. The Zeuzeridæ and Hepialidæ, excepting Æsculi and Ligniperda in the first-named family, are remarkable for the extreme shortness of these organs. Those of the male Leopard-moth are of a pretty globular shape, tapering into a fine hair. The antennæ of Filipendulæ partake of the shining metallic lustre of the fore-wings. The filiform, or simple, is decidedly the commonest form, and is to be found both in males

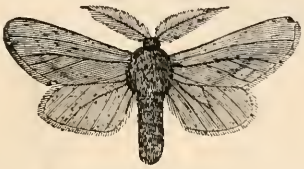


Fig. 52. *Philophora plumigera*, showing plumed antennæ.

and females, whilst plumed antennæ are peculiar, without exception, to males alone. Nearly all the Noctuas have them simple; but in some of the males they are slightly pectinated. The simple form seems to be the rule too with the Geometers. Of course of all the various kinds none are so beautiful as the plumed or feathery. We will take from the several genera a few of the most striking.

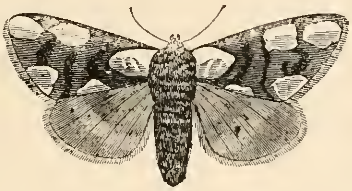


Fig. 53. *Thyatira batis*, showing simple antennæ.

The male Monacha, with its pure white shafts, is a pretty example. Potatoria has the rays so closely placed together as to appear almost united. Those of Carpini are of a very elegant leaf-like shape. Amongst the Geometers we have Pennaria—the Feathered Thorn, with the handsomest antennæ in the entire group. Roboraria is a type of strongly pectinated antennæ tapering gradually to a point. Fagi, in the Cuspidates, is another instance of the tapering form. But to my mind few are comparable to those of Plumigera, which resemble in miniature a lovely and delicate fern. Tenebrosa, Valligera, and Segetum are about the only examples in the Noctuas, and though serrated, they can scarcely be called plumed. The illustrations are taken from insects in my own cabinet, that of Galii from a bred specimen. JOSEPH ANDERSON, Jun.

Alresford, Hants.

"WE never collected a flowering plant, insect, or egg, without feeling that if there were any other way of getting at the knowledge we sought, we should prefer it. Life, however or wherever represented, is a sacred thing to the true naturalist."—*Half-Hours in the Green Lanes.*

THE BLUE GUM-TREE.

(*Eucalyptus globulus.*)

SO much has been said lately of this tree, and of its medicinal qualities, that I have thought a short account of it in SCIENCE-GOSSIP would perhaps be acceptable. It is a native of Tasmania, more particularly of the shores of d'Entrecasteaux channel, and of Tasman's Peninsula, preferring the damp slopes of the valleys which face the south, to those which have a northern aspect, and which are exposed in summer to the dry scorching winds from Australia. It is one of the most valuable timber trees in the world, and is admirably adapted for ship-building, for bridges, and all works requiring strength and durability. It is very rapid in its growth, so much so in fact, that any man in twenty years' time could find himself, if he chose, surrounded by a forest of his own planting. I have myself cut down a large grove, which I planted sixteen years previously, the individuals of which averaged 72 feet in height and 6 in girth. It attains at maturity enormous dimensions, probably excelling those of any other tree in the world. The Blue Gum has been known to attain the height of 350 feet, measuring 100 feet in circumference. Planks have been cut of 160 feet in length, 20 inches broad by 6 inches in thickness. In dense forests it rarely sends out a branch below 100 feet. It yields a highly astringent gum, which has been extensively used and found to answer as a "kino," and its leaves, by distillation, were found by Dr. (now Sir Robert) Officer, to yield an essential oil, having the same properties as cajeput oil.

From analogy it might be thought that the *Eucalyptus globulus* would flourish where the Myrtle does in the warm sheltered valleys of South Devon, and if it could be nailed to a wall, as proposed by a a writer in the *Times*, no doubt this would prove to be true; but from what I have said above it must be manifest that in the course of a few years the wall would give way from lateral pressure, and that both would perish together. I have no doubt that it would be an invaluable tree to plant in the pestiferous swampy regions of the West Coast of Africa, provided that the roots were not affected by salt water. No drains would be half so effectual as the pumping power exerted by the far spreading roots of this gigantic tree. It grows well in all parts of Italy, and at the Cape of Good Hope, and it has also been introduced into different parts of Victoria and of South Australia, and I have often wondered why it has not been established in Spain, Asia Minor, and Palestine, when we should once more see the hills of Judæa covered with forest.

In its early stages the foliage is quite different from that which it assumes when about five years old, being of bluish glaucous hue, with a very strong and pungent odour. When in blossom, the young trees have a beautiful appearance, and their large white globe-shaped myrtle blooms are the resort of innumerable parroquets, especially of the hairy-tongued *Trichoglossi* and of *Lathamus discolor*, which feed on the nectar extracted from the flowers. Gould has taken as much as a teaspoonful of honey from the mouth of a bird, shot by him whilst it was feeding. T. J. E.

A COLONY OF NATTERJACKS.

ONE day in June, 1871, with my curious instinct in "full swing," I happened to be strolling on a small heath a few miles from Kingston, Abingdon, and made a somewhat noteworthy discovery. In a quarry on this heath are several small pools, which at the proper season absolutely swarm with aquatic creatures. On the above day, after spending some time in exploring these pools, I was about retracing my steps to the high-road when a very dandy of a toad ran across the path. He was lighter and more active than ordinary toads, and sported a bright yellow stripe down the back. This was my first introduction to the curious Natterjack (*Bufo calamita*). He did not seem to be greatly prepossessed with my appearance, however, and scrambled away in the most surprising fashion; so that to get at all a correct idea of his appearance I was compelled to gently detain him with my stick. Compared with the bloated garden-toad, I had no hesitation in pronouncing my new acquaintance to be a decidedly handsome fellow. What he thought of me I know not.

Being anxious to witness his aquatic gyrations, I used a little persuasion with my stick and induced him to take to the water, where, after splashing and frolicking about with the agility of a frog, he attempted land, but being kept in awe by the aforesaid stick, he sat upright in the shallows and stared at me with a most doleful expression of countenance.

Presently a hoarse croak rose in the air; my acquaintance started, and so did I. We soon found out the cause, for on the opposite side of the pool, and perched on a clod of earth, was Natterjack No. 2, croaking as if his dear little head would break. Discarding my first acquaintance, I stepped across to welcome No. 2; but he suddenly ceased his song, and took a desperate "header" into the pool.

In June of the following year I learned a little more about "natterjackery," or, in other words, I became more conversant with the internal arrangements of the Natterjack's household. One day, while peeping about the pools, I saw the eggs or *ova* of the *Bufoidæ*; but how to distinguish between the spawn of *calamita* and that of *vulgaris* I know not. This beautiful spawn (I say beautiful with emphasis) is in the shape of double strings of clear, transparent jelly or gluten, in which are distributed indiscriminately the jet-black, bead-like eggs of the toad, about the size of ordinary shot. These strings of *ova* were wound round the weeds and about the stones at the bottom of the pool in the most singular and fantastic way.

On my next visit (July 13th) the pool was peopled with hundreds of black tadpoles, frisking, wriggling, and twirling about in all directions, and "enjoying life" as only tadpoles can. Some of them, however, had assumed hind-legs, others sported four and a tail to boot, and a few were toads in reality furnished with tails.

Then squatting in depressions of the sand near the edge of the water, were dozens of little natterjacks, crowded together, tiny fellows, whom the most spider-hating of spinsters could not call anything but "dear little things." These tiny toads had the vertebral stripe quite plain, and were active little creatures. Others were issuing from the pools. They appeared in sight from the dark part of the water, sat for a time in the shallows, and at length crawled out of the water, which they did not care about entering afterwards. On August 1st I went again, and found the little toads appearing very fast from the water. On September 14th, but few tadpoles and fewer toads were to be seen, and on October 12th every vestige of toad-life had disappeared.

A gentleman who resides within a short distance of this "colony of Natterjacks," informs me that, having taken several specimens of these toads from the pools and placed them on his lawn, he found them to be great travellers, as they wandered away in all directions. He also says he has often heard the evening choruses of the "colony" when nearly three-quarters of a mile away.

Kingston, Abingdon. W. H. WARNER.

ZOOLOGY.

EMBRYOLOGY OF BRACHIOPODS. — Professor Morse has recently shown that the embryo of the Brachiopods commences life as a little worm of four segments. After enjoying itself in swimming freely about the water for a time, it attaches itself to the sea-bed by its last segment, and thus settles permanently. The middle segment then protrudes on each side of the head segment and gradually encloses it, thus producing the dorsal and ventral shells so characteristic of the entire class.

HABITS OF SILUROID FISHES.—Mr. F. Day has just made a communication to the Zoological Society. When fishing at Cassegode he found that, after having caught a large number of specimens of various species of *Arius* and *Osteogeniosus*, there were several siluroid eggs at the bottom of the boats, and in the fish-baskets. These eggs were, on an average, half an inch in diameter; and on looking into the mouths of several of the males of both genera, from fifteen to twenty eggs were seen in each; those in the boats and baskets having evidently dropped out from a similar situation. The eggs were in different stages of development, some advanced so far as to be just hatched. They filled the mouth, extending as far back as the branchiæ. No food was found in the alimentary canal, though in the females it was full of nutriment.

New Classification of Birds.—At a recent meeting of the Zoological Society, Mr. A. H. Garrod read a paper in which he proposed a new classification of birds, founded mainly on the disposition of their muscles and other soft parts. The five muscles which he had observed to vary most were the ambiens, the femoro-caudal, the accessory femoro-caudal, the semi-tendinosus and the accessory semi-tendinosus. After stating which of these are present or absent in the different families of birds, he showed that the presence or absence of the ambiens muscle is so intimately correlated with other characters, that a division of the whole class into *Homalogonati* and *Anomalogonati*, depending on that peculiarity, would stand the test of much criticism. The Homalogonatous birds were divided into the Galliformes, the Anseriformes, the Ciconiiformes and the Charadriiformes; the Anomalogonatous into the Passeriformes, the Piciformes, and the Cypseliformes. Among the most important changes proposed or substantiated were the placing *Serpentarius* and *Cariama* with the Otididæ, the Cypselidæ with the Trochilidæ, and the Musophagidæ among the Galliformes.

The Basking Shark.—An interesting ichthyological discovery has lately been made by Professor Steenstrup, of Copenhagen. He finds that certain comblike bodies, which have been supposed to be appendages of the skin of certain sharks, are really sifting organs appended to the interior of the gill-apertures of the Basking Shark; and he infers that this fish, the largest shark of the northern regions, which attains a length of thirty-five feet or more, lives, like the still more gigantic whales, upon the bodies of small marine animals strained from the water by these peculiar fringes. The very fine rays composing the fringes are five or six inches long, and were some years ago shown by Professor Hannover to consist of dentine, so that each of them may be regarded as, to a certain extent, the analogue of a tooth. It is remarkable that Bishop Gunnerus, who originally described the Basking Shark (*Selachus maximus*), and regarded it as the fish that swallowed the prophet Jonah, had noticed the existence of these branchial sieves more than a century ago; but although some subsequent writers (such as Low, Pennant, Mitchell, and Foulis) have mentioned them, no one, except perhaps Gunnerus himself, seems to have recognized their importance in the economy of the fish. The late Sir Andrew Smith, however, describes the occurrence of a similar structure in his *Rhinodon typicus* ("the largest of living animals," according to Dr. Percival Wright, "the north whale excepted"), a near ally of our Basking Shark, which inhabits the Indian Ocean. Low states that the stomach of a specimen examined by him "was full of a red stuff, like bruised crabs, or the roe of the sea-urchin," but he could find no fragments of fish in it. It is very curious to find these monsters of the deep depending for their subsistence on creatures whose minuteness presents such an absolute contrast to their own gigantic bulk.

Disappearance of Colias Edusa.—Though I have been frequently about this autumn (1873) in a district of North Kent, where this butterfly is a well-known frequenter of the clover-fields, I have not seen a single individual. Irregularity in the appearance of the species is no new phenomenon, open as it is to various explanations. Having seen Edusa on the wing for several successive seasons, I have doubts as to the feasibility of the notion of a periodical disappearance. There is one circumstance that occurs to me that I have not as yet seen pointed out, viz., that as the larva feeds in clover-fields, the customary plan of the rotation of crops is highly against its increase. Thus, between Gravesend and Cobham are some extensive fields, a few years since covered with clover, where Edusa abounded; these are now cropped with cereals or potatoes, and the change was made just at the season when the larvæ, if hatched in the autumn, would be in a state of hybernation, and therefore, in such an event, likely to be destroyed. No doubt, occasionally at least, the species follows the habit of *J. rhamni*, and the eggs are not laid till the spring; but I am not inclined to the belief that this is the invariable practice, as some entomologists suppose. Were it so, we should more frequently meet with *C. Edusa* in the spring months; whereas, in fact, it is hardly ever seen then. There can hardly be any difference of opinion regarding the change the English climate has undergone during the last thirty or forty years, it having become, on the whole, decidedly milder; and it is an interesting subject of inquiry, in connection with the economy of our Lepidoptera, and indeed of insects generally, how far this alteration has affected, and will affect, their periodical times of passing through their transformations.—*J. R. S. C.*

Longevity of Birds.—At a recent meeting of the Dublin Zoological Society it was announced that a pelican, which had been living in the gardens of the Society for forty-two years, had just died. He was believed to have been eight years old when he was brought to Dublin. How thoroughly he had become acclimatized to Irish ways, is shown by the fact that his food for some time back had consisted of *whisky punch* and live eels. The report somewhat naïvely adds that "the spirit was taken with avidity."

MICROSCOPY.

Mounting Extraordinary.—As an illustration of what may be done in the way of mounting, we beg to notice a slide which has been sent to us by Mr. H. Dalton, of Dieppe, intended for a three-inch objective, on which is arranged a vase of flowers, of various species, in the most elegant and artistic manner. The flowers are formed of naturally coloured scales of butterflies' wings, and some hundreds have been curiously utilized for this purpose.

Crystals in Skin of Prawn.—On the subject of crystals in the skin of the Prawn, I do not think that the observation of Mr. Kyngdon, that "in a cast skin no crystals seem to be ever found," is quite correct, as in my Micro-cabinet are two home-mounted slides of prawn's skin, both, I feel certain, from those shed in the Aquarium, and one is labelled "Exuvia of Prawn." Either of them shows numerous crystals when examined by polarized light.—*George Guyon.*

Asphaltum and Rubber Varnish.—The difficulty I have experienced in making this varnish with mineral naphtha (as per the receipt given in Davis's book) has led me to try some other solvent. For some time I have been using "rectified spirits of tar" in lieu of alcohol, in all cases where the colour (sherry) is not objectionable, and on placing a piece of rubber in a small quantity of that spirit, I dissolved it in six hours, and the asphaltum in about the same time. "Spirits of tar" can be purchased at the oil and colour shops. I do not know the retail price, but I pay 45s. per cwt. for it wholesale. To test its purity, shake well in a bottle with an equal quantity of water, and note if separation takes place in a few seconds.—*Thomas Lisle.*

The Optic Nerve, &c.—By a microscopic examination of the retina and optic nerve and the brain, M. Bauer found them to consist of globules of $\frac{1}{2800}$th to $\frac{1}{4000}$th of an inch diameter, united by a transparent viscid and coagulable gelatinous fluid. —*E. Lovett.*

Mounting.—Having found considerable difficulty n keeping the objects in the right position when pressing down the cover on the balsam, it being so apt to slip out at one side, I tried fixing it first with gum-tragacanth, and I find it answer very well: the balsam seems to dissolve the gum, and removes all traces of it from the object. Perhaps this may be a valuable hint to young amateurs like myself; but I should like to know from some one experienced in mounting, if the minute quantity of gum will at all injure the specimen or produce fungoid growth on the object after a lapse of time.—*R. B., Jun.*

Prehensile Organs of Moth.—I inclose you a sketch of a microscopic slide, supposed to be the prehensile organs of a male moth, and shall be much

Fig. 54. Prehensile Organs of a Moth, × 40.

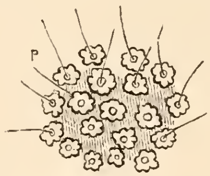


Fig. 55. *Pygidium* (?) of ditto, × 240.

obliged if any one of your readers can recognize and name it. I prepared the object about three years ago, and do not recollect upon what insect I was operating.—*R. H. N. B.*

BOTANY.

Botanical Extracts.—The following extracts from Childrey's "Britannia Baconica" (1660) may be of interest. In Cornwall "grows greater store of samphire and sea-holly (whose roots, commonly called Eringo-roots, are a great restaurative and corroborative, being preserved in syrup) then in any other part of England. Some of the gaully grounds do also yield plenty of Rosa Solis (more properly called Ros Solis, a plant that grows indeed on boggy and quagmiry grounds). Upon the sea-cliffs in Cornwall grow wilde Hysope, Sage, *Pela-mountain,* Majoram, Rosmary, and other fragrant herbs." "For fruits they have a sort called *Whurts*." Again: "In the forest of Savernac (*i.e.* Savernake) grows a kind of sweet Ferne:" "in the Fenns of Cambridgeshire grows Scordium or Water Germander:" "in the Isle of Axholme grows a sweet kind of shrub called *Gales*, as also *Pets* in the Moores [I know not what that is], and dead roots of Firre-wood which in burning give a rank sweet smell." Again: "At Stratton in Cornwall grows the best Garlick in all the Countrey. It may be old Mr. Chamond, (uncle and great-uncle to, at least, 300 persons) owed part of the cause of his great age, to his living so near the best Garlick, the countreyman's Treacle." He states elsewhere that the countrymen in Cornwall are great eaters of garlic for health's sake; whence they call it there, the Countryman's Treacle.—*R. T., M.A.*

Medicago arborea.—I wish to correct an error in the paragraph under this head in last month's Science-Gossip. It was stated that the plant forms beautiful hedges at *Florence, close by the sea*, instead of *Leghorn*. The shrub is now (February) in full flower in Mr. Balchin's Nursery at Hove, and is a perfect picture, at least ten feet high.—*T. B. W., Brighton.*

The Potato Disease.—Our readers will remember that in an article on this subject which appeared in our columns in the autumn of 1872, Prof. Dyer recommended the culture of an early potato, one that would be fully grown before the period when the potato disease set in. The Royal Agricultural Society of England have now offered two prizes for disease-proof potatoes, one of £100 for *early* tubers which shall be disease-proof for three years, and another of the same sum for a *late* potato, to be tested for the same period. A policy like this is worth any number of prize essays.

Seaside Shrubs.—It is most desirable that in selecting shrubs, &c. for the most exposed spots on the seashore, it should first be ascertained which are most appropriate and best calculated to stand the strong winds and salt spray from the sea. Elms, sycamores, and chestnuts have been planted on the new Undercliff-road at Brighton, and have, of course, all died; there are, however, British shrubs which not only thrive by the seaside, but (one at least) never found at a distance from it; in fact, the sea-air, saturated as it is with saline matter, is its natural element. The Stalwort or Sea-blight (*Salsola fruticosa*, L.; *Swæda fruticosa*, Forsk) is a shrub that is only indigenous on the seashore, or in saline plains and other places where the soil is impregnated with salt: it is one of the rarer British species, found only on some parts of the eastern and southern coasts; it is a shrubby, erect, branching, evergreen perennial, from three to four feet high, with thick, succulent, and bluntish green leaves and small stalkless flowers (see Hooker's "British Flora" and the "Treasury of Botany"). Several strong clumps of the shrub may be seen in Mr. Spary's Nursery at Brighton. There is another shrub which, though not confined to the seaside, is found to thrive on the most exposed parts of the coast, viz., the *Hippophae rhamnoides*, or sea-buckthorn; it is indigenous on exposed sandy cliffs in the town of Folkestone, at the back of and above the Coast Guard Station. It is described by H. G. G., in the last December number of Science-Gossip, as growing on the coast of Norfolk in abundance for about half a mile in extent, in spots clumped together in dense masses and covered with orange-coloured berries; it is indigenous on the sand-hills and cliffs on the coast of Kent, Essex, Norfolk, Lincoln, and Yorkshire, also on the Firth, the Clyde, in Islay, and Kintore in Scotland; it is diœcious, the male and female flowers being on different plants; the pretty orange-coloured berries will therefore not be produced unless the two sexes are near to each other. For a fuller description of it the reader is referred to the December number of Science-Gossip. It appears that seaside plants have generally small leaves, which are but little affected by the strong cutting winds. It is hoped that this notice will induce a reference by the readers of Science-Gossip to other shrubs found applicable to exposed seaside spots.—*T. B. W.*

Acclimatization of Eucalypti.—In a letter in the *Times*, 17th January, 1874, it was stated that some *Eucalypti* (blue gum-trees) had been grown in the open air at East Grinstead, Sussex, and that they had survived two winters without any protection. The leaves of the *Eucalyptus* manufactured into cigars, were shown at the Great Exhibition at Paris, 1867, and recommended as being very efficacious in aiding digestion. And in the *Gardeners' Chronicle* it is stated that a species of this plant had been recently used on the Continent in the place of lint, the leaves being merely laid on the wounds. Their balsamic nature not only cures, but after a few hours all unpleasant odour ceases.—*H. G. G.*

GEOLOGY.

The Ancient Volcanoes of the Highlands.—This was the subject of a paper recently read before the Geological Society by J. W. Judd, F.G.S. That the rocks forming the great plateaus of the Hebrides and the north of Ireland are really the vestiges of innumerable lava-streams, is a fact which has long been recognized by geologists. That these lavas were of *subaërial* and not *subaqueous* origin is proved by the absence of all contemporaneous interbedded sedimentary rocks, by the evidently terrestrial origin of the surfaces on which they lie, and by the intercalation among them of old soils, forests, mud-streams, river-gravels, lake deposits, and masses of unstratified tuffs and ashes. From the analogy of existing volcanic districts, we can scarcely doubt that these great accumulations of igneous products, which must originally have covered many thousands of square miles, and which still often exhibit a thickness of 2,000 feet, were ejected from great volcanic mountains; and a careful study of the district fully confirms this conclusion, enabling us, indeed, to determine the sites of these old volcanoes, to estimate their dimensions, to investigate their internal structure, and to trace the history of their formation. The following is Mr. Judd's conclusion on his paper:—It appears that during the Newer Palæozoic and the Tertiary periods, the north-western parts of the British Archipelago were the scene of displays of volcanic activity upon the grandest scale. During either of these, the eruption of felspathic lavas, &c., preceded, as a whole, that of the basaltic; and in both the volcanic action was brought to a close by the formation of "puys." The range of Newer Palæozoic volcanoes arose along a line striking N.E. and S.W.; that of the Tertiary volcanoes along one striking from N. to S.; and each appears to have been connected with a great system of subterranean disturbance. It is an interesting circumstance that the epochs of maximum volcanic activity, the Old Red sandstone and the Miocene, appear to have been coincident with those which, as shown by Prof. Ramsay, were characterized by the greatest extent of continental land in the area. The Secondary strata were deposited in the interval between the two epochs of volcanic activity, and the features which they present have been largely influenced by this circumstance. Apart from this consideration, however, the volcanic rocks of the Highlands are of the highest interest to the geologist, both from their enabling him to decipher to so great an extent the "geological records" of the district, and from the light which they throw upon some of the obscurest problems of physical geology.

The Geology of the "Far West."—Prof. Marsh has just communicated the results of his recent expedition to the Far West in search of fossil remains of extinct vertebrates. The richest field for exploration was found in the great basin of the pre-historic lake which is now drained by the Colorado river. This body of water was origiually as large as all the present lakes of the North-West combined, and had existed so long that the sand washed down from the surrounding hills had accumulated to the depth of a mile. In the different strata of this bed at least ten distinct groups of extinct animals could be detected, among them some extremely remarkable forms. One of these was a rhinoceros with two horns; but these were placed, not like those of the modern rhinoceros, in the axis of the body but transversely. In a space of 10 feet square he had sometimes found the bones of 30 different animals. The number of species of extinct mammals in these remains he estimates to be three times as great as that at present inhabiting the same locality.

Palæotherium magnum.—In *Nature* of the 12th February is an account of the discovery of a complete skeleton of this early eocene mammal. The woodcut shows its outline to more nearly resemble that of the Llama than any other known creature; thus completely disabusing the old Cuvierian idea that it was bulky, and more or less resembled the Tapirs. The height was just below that of a middle-sized horse. This important specimen, which is now in the Museum of Natural History at Paris, was obtained from a gypsum quarry at Vitry-sur-Seine. All its bones, including those of the toes, are in their natural position.

The Origin of Precious Stones.—Mr. Greville Williams has recently contributed his researches on this interesting subject to the Proceedings of the Royal Society. The colouring matter of the emerald has been attributed to iron, chromium, and organic matter. With regard to the latter, Mr. Williams thinks that both emeralds and beryls contain carbon; but that it is probably in the form of diamond, and has nothing to do with the colour of the emerald, as colourless beryls may contain as much carbon as the richest tinted emerald. The colour is really due to the presence of chromic oxide. Mr. Williams then gives the results of his experiments on the effects of fusion on opaque beryls, emeralds, and an artificial mixture of beryl ingredients. The author expresses his opinion that whatever may have been the temperature at which beryls and emeralds were formed, rubies must have originated at a very high temperature, since the peculiar reaction between alumina and chromic oxide, to which the red colour of the ruby is due, takes place only at a heat as high as that of the oxy-hydrogen flame.

A new Species of Fish in the Millstone Grit of Yorkshire.—At the monthly meeting of the Manchester Geological Society, held on the 27th of January last, Mr. John Aitkin, F.G.S., of Bacup, exhibited and described a number of very fine speimens of fish of the genus *Acrolepis*, new to science, which he had obtained from the débris brought out in excavating a tunnel through Wadsworth Moor, in the neighbourhood of Hebden Bridge, near Halifax, in a bed of fine black shale separating the third from the fourth or Kinder Scout Grit; the principal specimens having been obtained from nodular concretious which abound in the shales at this horizon. The specimens comprise two nearly perfect heads (in the jaw of one a tooth is exhibited *in situ*) and several parts of the body illustrating the form and structure of the fish; amongst which are remains of two or three fin-rays. The scales and head-plates are beautifully ornamented and covered with a fine enamel, the former being rhomboidal in form and profusely sculptured, having a number of distinct waving ridges and furrows traversing them in the direction of their longest axis, varying in number according to the position they occupied on the body of the fish, the ridges having a strong tendency to bifurcate, and not unfrequently to further subdivide into two or three branches; these often again converging and becoming again reunited. The genus *Acrolepis* has been figured by Professors Agassiz, M. Coy, and King, the specimens having been obtained from the magnesian limestone of this country and Germany. The specimens, however, under consideration have much larger scales, and differ in the style of ornamentation, as well as in many other essential particulars, from any of the figures referred to, leaving no doubt as to their constituting a new species of this rare fish. The discovery also carries this genus into a new horizon, which has previously been considered as almost barren ground. It is now known to be co-extensive with the carboniferous system, ranging from the mountain limestone through the millstone grit and coal-measures into the Permian formation, where it appears to have attained its maximum development, its remains having been found there more plentifully both in our own country and on the Continent than in any of the older members of the system. It is intended shortly to have the specimens described and figured, so that palæontologists may have an opportunity of judging of the value of the discovery. In addition to the specimens above referred to, Mr. Aitkin also exhibited remains of four or five other genera of fish, viz., *Acanthodes*, *Cladodus*, *Rhizodus* (?) *Ctenocanthus*, and *Palæoniscus*, together with a considerable variety of other fossils, all from the same locality.

NOTES AND QUERIES.

THE BARBASTELLE BAT.—On the 15th of December last, a specimen of the Bat tribe was brought to me by some children, having been found behind a tradesman's sign-board in this village. Handling the queer little creature rather cautiously, I placed it on the window-seat, and then proceeded to "take stock" of its appearance. It seemed almost torpid, but after a time it revived a little, and on being touched raised itself half-upright, and opening its mouth to its fullest extent, uttered a spitting hiss like an angry cat. While watching these evidences of "bat temper," it occurred to me that I had never seen such a queer little specimen of the *Cheiroptera* before, so, after taking as minute a description of his tiny person as his ill-temper and my fears would allow, I popped a wire meat-cover over him, and then fell to consulting my books, &c. The result of these inquiries satisfactorily proved my bat to be a specimen of the Barbastelle (*Barbastellus communis*), a decidedly uncommon species. With additional respect I approached the captive once more and raised the cover, when, behold! after turning up his queer little nose as if in derision, he took to flight with the greatest ease, and was flying in smooth circles round the room before I could say "Jack Robinson;" thus negativing the general opinion that bats cannot rise into the air from a flat surface. Adroitness and tact, however, soon consigned him to the cover again, and when in it, he ascended to the top, and began to traverse the roof with great rapidity, putting himself into all sorts of queer positions, and proving himself to be a decidedly impatient and ill-tempered little fellow. I have reason to believe that this bat was not hybernating where it was found, but had merely chosen the sign-board as a temporary resting-place.—*W. H. Warner, Kingston, Abingdon.*

LOCAL NAMES (p. 22).—The name "Feather-poke" signifies the Chiff-chaff (*Sylvia hippolaïs*). The word "poke" means a sack, and therefore the name is, literally, a sack of feathers. The nest of the Chiff-chaff is found completely lined with feathers, and hence the local name has arisen. "Ground-lark" is a name which has been applied both to the Pipit (*Anthus*), and the Bunting (*Emberiza*).—*Edward Fentone Elwin, Caius Coll., Camb.*

H. VELLEDA (NORTHERN SWIFT).—In "Notes on the Entomological Season of 1873," p. 1, No. 109, there is the following paragraph:—"*H. velleda* (Northern Swift) has been extending its southward range: it has been reported from Somerset, Folkestone, and Norfolk." It may be interesting to the writer and other entomologists to know that, in June last, I took the insect in this neighbourhood, which is almost to the extreme south. The markings closely resemble the northern specimens, but are of a much fainter colour.—*Joseph Anderson, jun., Alresford, Hants.*

THE POSTAL MICRO-CABINET CLUB.—The above club, of which a notice appeared in SCIENCE-GOSSIP for December last, together with a copy of rules, is now working well, and is likely to prove quite a success. The "Notes and Queries" department, to which every member is invited (and mostly accepts the invitation) to contribute, being by no means the least attractive part of the scheme. We shall be glad to increase our number of members, now numbering thirty-six, divided into three circuits of twelve members each. Any microscopist who would like to join us, will please write to Alfred Allen, Hon. Sec., Felstead, Essex.

LOCAL NAMES OF BIRDS.—In answer to Arthur Smyth's inquiry as to the local names of birds, I beg to say that "Feather-poke" is that by which the Longtailed Titmouse (*Parus caudatus*) is ordinarily known to the rural population of Nottinghamshire and the adjacent Midland counties; as a boy, I knew it only by that designation. The name originates from the interior of its beautiful globular nest being a mass of feathers of the softest kind. The term "ground-lark" is also commonly used in Notts for the Meadow Pipit (*Alauda pratensis*). The egg of the Feather-poke is not nearly the size of the house-sparrow, nor at all resembles it in appearance, so that Mr. Smyth's friend has misinformed him: it is about the size of a pea, white, with obscure markings. The number deposited varies from twelve to eighteen. The old and young birds keep together during the autumn and winter months, and at the present season may be occasionally seen actively engaged in company searching the branches and twigs of shrubs for insect food, running up and down, turning and twisting, head or tail uppermost, in true "Tit" fashion.—*George Gascoyne.*

Rare Insect.—In "Notes on the Entomological Season of 1873" (Science-Gossip, No. 109, p. 1), "M. H." says, "*H. velleda* has been extending its southward range; it has been reported from the Quantock Hills, Somerset, from Folkestone," &c. As far as Kent is concerned, *H. velleda* is quite an old inhabitant, as, on referring to Westwood and Humphrey's "British Moths," I find "the species has been found plentifully in Darenth Wood, Kent;" I have not heard, however, of its having been taken there of late years. In a wood in the neighbourhood of Chatham, I have been in the habit of taking this species for the last twenty years, my first record bearing date May 23rd, 1854, since which time scarcely a year has passed without an entry of its capture, my last date being June 23rd, 1873. It must, therefore, have been many years ago since it extended its southward range into Kent, as Westwood's statement must have been written quite thirty years ago. In some years I have seen this insect in great profusion; it seems to prefer underwood of about two years' growth, through and between which it flies very rapidly between sunset and dark. From the above facts, both as to the time it has been observed, and the moth not being at all a weak insect on the wing, we need not be surprised at its occurrence at Folkestone, nor, indeed, at any other part of Kent, and may expect to hear of its turning up both in Sussex and Surrey. I may also add that, in addition to the two *L. albipuncta* taken at Folkestone, which I have seen, several others were taken there by another collector; two were also taken in the Isle of Sheppey.—*W. Chaney.*

Snakes and Toads.—One day, while hunting for specimens in the early summer with a friend, we came across a fine snake, measuring a little more than a yard. While measuring it we remarked a sort of protuberance or lump midway between its head and tail. We took no further notice of this, carrying the snake with its head downwards, till it appeared that the lump moved gradually toward the head. Fastening a piece of grass to the end of its tail, and hanging it to a tree, we anxiously awaited the result. At last its mouth began slowly to open, and a large toad made its appearance. The toad was covered with a greenish slime, and after some minutes recovered, and was, seemingly, little the worse for its imprisonment. My friend still has both the snake and toad preserved in spirits of wine. The snake was the common grey, and not by any means the largest of that kind that I have seen.—*Brynffynnon.*

Microscopic Fungi.—I have lately been searching among some large beds of *Iris fetida* for its Puccinia, and have discovered one plant only with sori; but on bringing it home found that the spores were only in the uredo state. Will some of your "Puccineous" correspondents be so good as to tell me something of the history of *P. truncata*—do the brand-spores succeed, or precede, the uredo form? It is inconvenient to me to watch this infected plant of Iris, so that I should like to know at what season to find the characteristic spore.—*J. G. M.*

How to Prepare Skeleton Leaves.—Skeleton leaves obtained by boiling in caustic soda (see vol. viii. p. 30) are of a light brown colour, and require so long an immersion in chloride solution to whiten them, that they are quite destroyed unless the fibres are unusually stout, and even then the stems seldom become white. Would Mr. J. F. Robinson, or any of your readers, oblige me by stating how the specimens may be properly bleached and attain the whiteness of such as are prepared in the old way?—*J. L. B.*

A Protest.—As the collecting season is approaching, pray allow me to enter an emphatic protest against the gradual extermination of the rarer species of our birds, insects, and plants, carried on from year to year by a number of persons calling themselves naturalists, who can, however, have little of that true love for nature which can admire the beautiful and interesting without their hands itching to take possession. There can be little doubt that if something is not done to check this injurious propensity, in a very few years nothing but the more common varieties will be left. How many beautiful kinds of birds might have become naturalized amongst us, had not the first-comers invariably fallen before the guns of brainless fellows whom it would be absurd to call sportsmen? Then with regard to the destruction of the rarer kinds of butterflies, &c., I need only refer to the January number of Science-Gossip for the present year, page 1, where the writer says, amongst other things, that the "take" of *V. antiopa* last year is considerably less than in 1872, and that the disparity is probably owing to the fact that almost all the individuals seen in that year were netted, so that few were left to perpetuate the species! Then as to the exterminating collection of botanical specimens, a case in point appears at page 91 of Science-Gossip for 1870. In reply to an inquiry as to whether the rare *Pyrola media* is still to be found at Stock Ghyll, Ambleside, the writer states that on a certain date, after a long search, he obtained *five specimens*, and apparently not content with this large number, three weeks later went over the ground again with a friend, but without finding a single plant. Is it any wonder, after reading the above, that the habitats of many of our choice wild flowers are yearly becoming fewer in number? It ought to be an invariable rule with all true naturalists—*to take nothing that is rare.* When a species becomes plentiful then specimens in *moderation* may be taken; till then the motto should be "Eyes on and hands off."—*C.*

Grafting: Strange Freak.—A moss rose grafted on the common cabbage rose produced a shoot on the top of graft same as the parent stock, the flowers on which were cabbage roses and those on the centre of same shoot moss roses.—*S. A. B.*

Winter Stores.—Five or six weeks ago, in a walk with one of my neighbours, we found several patches of a brightish substance which, at first, we thought was a sort of fungus. On procuring a portion, we were somewhat surprised to find that the supposed fungus was a collection formed of fragments of hips and haws. These fragments were found in detached cemented masses of irregular form, from four to seven or eight inches across. I send you a piece: it may, perhaps, be not worthy of your notice, a great part of its beauty being gone. When we first saw them, on a bright December day, among the dry grass at the roots of a quickset hedge, they really looked beautiful. Your piece, collected yesterday, is dull after being exposed for weeks to the weather. I suppose the authors are the little field-mice.—*Thomas Cape.*

SPARROWS' EGGS IN DECEMBER.—On the 4th of December last whilst going over an old steeple near here (Orlestone, Kent), I accidentally found a nest of the house-sparrow (*Passer domesticus*) containing four eggs. Upon breaking one, I found it to my great surprise to be perfectly fresh, and evidently laid within a few days. The weather had been very mild for some time past. Is this a common occurrence, or not?—*H. W.*

BRITISH OROBANCHACEÆ.—I shall feel much obliged if you or some of the correspondents of SCIENCE-GOSSIP can furnish me with any new observations with reference to the British Orobanchaceæ. I shall be very glad of specimens of the plants, and especially so of the seeds of the different species of this family, as well as notes of experiments that may have been tried in their culture. I shall be happy to send specimens of other plants or seeds in exchange.—*James Fletcher.*

SAXIFRAGA GRANULATA.—I should be glad to hear the general opinion as to the nature of the characteristic granulations in the stem of *Saxifraga granulata*. Hooker in his Student's Flora says, "Stem bulbiferous," and further describes the "bulbs as large as a pea, brown." Bentham, in his British Flora, says that the "perennial stock is reduced to a cluster of small bulbs." Now Bentley in his Manual says that bulbs are confined to monocotyledonous plants. How can the contradictions be reconciled?—*W. G. Piper.*

VERBASCUM AND DIGITALIS.—During a short stay at Brentwood this last summer I was struck with the almost entire absence of any plants of the genus Verbascum, the only plant which I saw of it being a dwarfed seedling. Their place seems to be entirely filled up by the *Digitalis purpurea*, which was a conspicuous object in many of the hedgerows. Round Norwich, and indeed throughout Norfolk, the reverse is the case, Verbascums being common, and the only plants of Digitalis which are found being escapes from cultivation. Is this absence of Verbascum in presence of Digitalis a general thing, or is it merely confined to the above-mentioned localities, and how may it be explained?—*W. G. Piper.*

THEOBROMA.—In Humboldt's "Views of Nature" I find it mentioned that the flowers of *Theobroma cacao* are frequently found on the root. Are there any analogous cases of this anomalous production of flower-buds on roots, or is it a frequent or only a casual occurrence?—*W. G. Piper.*

A NATURAL BAROMETER.—In some countries frogs are used as barometers: the species employed for this purpose is the green tree-frog. They are placed in tall glass bottles with little wooden ladders, to the top of which they always climb in fine weather and descend at the approach of bad weather. This is a cheap and highly interesting weather-glass where the green tree-frog is to be procured in its natural state.—*E. Lovett.*

INSECTS' EGGS.—Could any of your readers inform me why, or if it is usual, that *Thecla quercus* should lay their eggs on *Fraxinus excelsior*, when *Quercus pedunculata* is more plentiful in the same locality, as I have constantly noticed it to be the case?—*H. Glazbrook.*

LARVA FROM PARIS.—Last September, in some of the parks of Paris, I found six larvæ, about two inches or two inches and a half long, very thick and fleshy, of a delicate pale green colour, and bearing a few short spines. By the beginning of October, they had all spun cocoons, varying in colour from dirty-white to light reddish-brown, rather small in size, compared with the larvæ. The trees on which they feed grow luxuriantly in the Boulevards, parks, and suburbs of Paris, and somewhat resemble the Ash, but the foliage is brighter green. These trees appear to be rather scarce here, or, at all events, not common enough to obtain food easily for a brood of caterpillars. Now, as I expect to get a good supply of eggs, from which I should like to rear a number of larvæ, I shall feel greatly obliged to any of the readers of SCIENCE-GOSSIP who will inform me if they know of any common tree or plant which will answer as a substitute for their natural food-plant. I should be glad to know the name of the moth, which I fancy has been recently introduced from China or Japan.—*E. D. M.*

STAG-BEETLES.—Several old and decayed trees have been recently cut down in Greenwich Park, and a few days ago a piece of wood, a foot in length, and four inches in thickness, taken from the root of one of them, was brought to me; the outer part was perfectly decayed, so that it crumbled at the touch, and it contained about twenty larvæ of the Stag-beetle (*Lucanus cervus*). The larvæ, which had the usual white fleshy appearance, were from one to two inches in length, and very sluggish. Among them I found an extremely small male stag-beetle, rather more than half an inch in length. I placed the wood in a box, and in two days the larvæ had buried themselves completely, and were out of sight. About Blackheath and Greenwich Park, in July and August, the perfect insects may often be found on fine evenings in considerable numbers, crawling up fences or flying about. I have sometimes obtained a dozen or more in an hour's search.—*E. H. Glaishier.*

THE AQUARIUM IN WINTER.—I don't see how W. Swatman is to keep his aquarium out of doors successfully during the winter, and would not recommend any plan for so doing. Can he not remove it for the season and place it near a window? The pleasure of studying the aquarium, I should say, would be considerably enhanced if he could do so. I keep golden and Prussian carp, roach, and a swarm of minnows, and some mussels. These I find, after much experience, to be far the best for a furnished aquarium. Your perch doubtless gobbled the newt, for they are most hungry creatures, though I never heard of one doing so before. I would add, that I filled my tank with water, Sept. 1872,—it contains about twenty gallons and thirty fish, and have never lost one.—*M. H. Clare, Cheltenham.*

IONIAN SNIPE.—The late Lord Lytton, in his translation of the Epodes of Horace, in a foot-note at page 424, of the second Epode, alludes to the line "Non attagen Ionicus;" the "attagen," he writes, being variously interpreted woodcock, snipe, and more commonly moorfowl. The Ionian Snipe is, to this day, so incomparably the best of the Snipe race, that I venture to think it is the veritable "attagen Ionicus." Would any of your correspondents kindly supply me with a few particulars relative to the superiority of this snipe over the other varieties? Does it bear the palm for flavour and size? On a reference to Montague's "British Birds," edited by Newman, nine kinds of snipe are mentioned, but I fail to see any allusion made to the Ionian kind.—*John Colebrooke.*

Euplectella.—At p. 23 Mr. Spicer asks for an explanation of the presence of a crustacean in the interior of a specimen of the above. This is easily furnished; the fact being that the crustacean is invariably placed in the Euplectella by the dealers; or, at any rate, by the native preparers of the specimens. If any one possessing one of these sponge-skeletons will open carefully the ends of the tuft of spicules forming the anchoring-means at the base, the end of the tube will be found quite open and ready for the introduction of the crustacean, or any similar object that the ingenuity of the preparer may suggest.—*E. B. K. U.*

How to Destroy Ants.—If "E. B. F." will place a brood of young chickens or pheasants in a coop near to the ant-hills, and then with a trowel turn the eggs and ants to the surface, he will find them quickly disappear. The birds must not be more than a fortnight old, or they will do harm to the plants. By this method I have quite cleared my garden of these troublesome intruders.—*L.*

Fresh-water Aquarium. — In reply to "M. A. H.," I may say that the kind of tank suitable, would, of course, depend on his own fancy: some prefer oblong, some round tanks. My own is a common propagating-glass, about 16 inches in diameter. The first thing he must do is to get some yellow loam, wash it well, place a layer, about two inches thick, inside the glass; he must then plant his aquatic plants in this loam. Next procure a small quantity of gravel, which he must strew on the top of the loam, the object of this being to keep the water clear. Now fill it up with water, let it stand for about a week before putting any fish in. The fish should be gold carp, a few minnows, tench; a small eel or two might also be introduced with advantage. The mollusks should be a few *Paludina vivipara* and *Planorbis corneus*, which act as scavengers, by eating up the green confervæ which accumulate, more especially during the summer months, on the sides of the tank. Now as to the insects. The only insect I find that agrees with the fish is *Hydrous piseeus*, a specimen of which I have kept for the last six months. I may say that I am only an amateur in aquariums, having only kept one for a little over twelve months, but I think very successfully, as I have maintained the balance between the animal and vegetable life so well that I have not changed the water once since I first put it in. My plants are *Vallisneria spiralis* and *Anacharis alsinastrum.* If "M. A. H." cannot obtain them, I shall be most happy to send them to him, or any one who wishes them; if he will forward to my address a box suitable for the purpose.—*J. L., Wigan.*

Vipers Swallowing their Young.—In No. 104, for August, 1873, I find quoted from Jas. Kirby, an article on the topic of "Vipers swallowing their young," which still keeps alive the inquiry as to the motives or objects of this well-known habitude of some reptilia. That alligators swallow their young I have had ocular demonstration in a single case; and have the universal tradition of negroes and whites in this region of Louisiana, Mississippi, and Texas, that such is their habit. In the winter of 1843-4, I was engaged making a survey on the banks of the Homochitto Lake, near the Mississippi river, S.W. front of that State. The day was warm and sunny, and as I halted near the margin of a pond nearly dried up, to pick up some shells, I startled a litter of young alligators, that scampered off, yelping like puppies; and retreating some twenty yards, to the bank of the Lake Homochitto; I saw them reach their refuge in the mouth of a five-foot alligator. She evidently held open her mouth to receive them, as, in single file, they passed in beyond my observation. The dam then turned slowly round and slid down beneath the water, passing into a large opening in the bank, beneath the root of an ash-tree. The water was rendered turbid here and nowhere else, enabling me to find the mouth of what was, probably, the place of hybernation. I made a communication of these facts to Sir Charles Lyell, who visited me shortly afterwards. Some notice was made of it, and I think the statement will be found in the volume of his "Second Visit to the United States." Doubtless, this refuge is temporary, and the young are released at their own or the mother's pleasure; the descent being but partial, in no way reaching or interfering with the process of digestion. I have found the stomach of an alligator, killed during winter, when nearly torpid, almost empty and clean, excepting the two or three pieces of wood—cypress, if I correctly remember—rounded off, as if by attrition or lateral friction, of three, six, and ten cubic inches. These are common, and taken in doubtless for slow digestion during hybernation.—*Caleb G. Forshey, Fellow N. Orleans Academy of Science.*

The Hedgehog.—The interesting paragraph on the common Hedgehog in last month's number of Science-Gossip, I am able to supplement from experience. The Hedgehog is frequently infested by a mite, which lays its eggs in the skin; the mites increase with astonishing rapidity and weaken the Hedgehog by their constant feeding upon it. The frequent use of soap and water is absolutely necessary to free the Hedgehog of the parasites; tobacco juice may be used also with advantage. No animal is fonder of water than the Hedgehog, which swims and floats in it, with evident delight. When domesticated, the Hedgehog requires a roomy deep box or basket, well filled with hay or paper shavings; it likes to be well covered and warm; it requires milk, and for food any scraps from the dinner-table, bones of pigeon, partridge, chicken, the small bones of lamb, pieces of liver, and bits of lean meat. In autumn, hedgehogs begin to look out for a winter sleeping-place, and ought to have a convenient box prepared for them, with plenty of hay; they make a neat nest for themselves and ought not to be disturbed; it is sufficient to feel if they are warm; if they are uncoiled and cold, they must be attended to directly, warmed and well fed, after which they will probably go to sleep again. Hedgehogs that are thrown out of their natural habits by being domesticated, seldom lie dormant for more than a week at a time. The Hedgehog becomes a most interesting pet, soon knows its name, and is very gentle and most grateful for kindness, and patient under the washings necessary for keeping it free of parasites, making itself *sleek* to the accustomed hand.—*Jane Barwell Carter.*

Derivation of "Lady-bird."—Could any of the numerous readers of Science-Gossip inform me the correct derivation of the word "Lady-bird"

(*Coccinella septempunctata*)? It never struck me as anything out of the way till the other day, when I happened to hear an argument upon the subject, which was brought to a termination by my friend saying he had tried to find this point out but had not succeeded, it had therefore been allowed to fall through.—*T. Palmer.*

Remounting Objects.—I bought some old but very fine injections in fluid the other day. But they all want remounting, as the cells contain air more or less. I have remounted several in fresh Goadby solution, but I am not sure whether the old fluid was the same. How can I find it out? I notice some of the newly mounted specimens have shrunk a little. I have tried the old solution with various tests, and I think proved that it was not spirit and water, or chloride of calcium. Please advise me, as I should be sorry to spoil them.—*Wm. Statham.*

A White Robin.—Much has been said lately by some of your correspondents about white sparrows; doubtless they would be interested to hear of what I consider a far greater rarity. Some years ago an uncle of mine caught in a trap (what was said to be) a white robin. It was identical in form with the redbreast, but its plumage was of a creamy white, and it had bright pink eyes. The bird was kept in a cage for some weeks after its capture, but at length it died. Its body was preserved, and, of course, regarded as a great curiosity. —*G. O. Howell.*

Extracting Lingual Ribbons.—What is the best method of extracting the lingual ribbon (palate) of very small mollusca? I find *liquor potassæ* answer in most cases; but with Clausiliæ and other small shells I have completely failed. I suppose that the membrane is so delicate that the liquor potassæ dissolves it.—*C. P. Ct.*

A Mysterious Mousetrap.—Last night when I left the office an ordinary 1d. mousetrap was baited and set. This morning, in looking for a prisoner, the trap had gone, and after a while I found it removed some little distance from where it was set, covered with blood, bait gone and within a foot of it was the mutilated remains of a mouse. Not a bit of flesh could be seen, and it seemed as if it had been nicely skinned, minus one or two small portions of which were missing. The head was scalped. Can any of your readers tell me how this could have occurred? The trap was set in a large drawer, consequently out of a cat's reach, and no cat is kept. I may mention that a mouse caught two days previously swarmed with small insects very like fleas. Could these insects have done the mischief, or would other mice have eaten their brother?—*Joseph J. Warry.*

Fresh-water Aquaria.—There have been, from time to time, so many hints given with regard to aquariums in the pages of Science-Gossip, that it seems almost like sending coals to Newcastle to forward any further information; but since "M. A. H." requests it, I will just say that I found a slate square tank, with a glass front and glass top slides, answer most admirably. I purchased this tank for a marine aquarium, changed my mind, and converted it into a fresh-water one. I put a little rockwork in it to afford shade for the fish, and introduced a few plants, *Vallisneria spiralis, Chara vulgaris,* and *Anacharis alsinastrum* (confervæ will usually appear spontaneously if the aquarium is in good order). The Water-boatman, and the large Water beetle, *Hydrous pisceus*—not the carnivorous Water-beetle mind—and the Caddis-worm are all suitable. Sticklebacks are very amusing, but I gave them a glass globe to themselves. I went in largely for fresh-water aquaria at one time. I had a small pond in the garden stocked with gold-fish, the snig-eel, the common frog, and the smooth water-newt; I also had a large round glass aquarium in the greenhouse with millers'-thumbs, small water-tortoise, and minnows. Much depends, of course, on the size of the aquarium "M. A. H." wishes to stock. He must not over-crowd it. The fresh-water Limpet and the viviparous Paludina are desirable inmates, but I should never put the Duck-mussel, or either of the Mud-shells in a tank; they are better suited for a pond out-of-door aquarium. Small Cray-fish are interesting, if, like the Sticklebacks, they have a glass house to themselves. Whirligig-beetles do well in an open aquarium, and the least mud or earth put at the bottom of an aquarium the better. I used to put river-sand and well-washed pebbles in mine, water alone being sufficient to nourish the aquatic plants. I had a small jet of water over the glass tank in the greenhouse, which I could turn on at will, and I found it a great aid in keeping the inhabitants of the aquarium healthy.—*Helen Eliza Watney.*

Wood Ants (page 283, last vol.).—I have frequently observed wood ants ejecting formic acid in the manner described by Mr. N. M. Richardson, and have pointed out the fact to others. If, after the nest has been disturbed, the hand be passed over the surface of the ant-hill, the drops of fluid produce a sensation of cold upon the skin, and if a clean steel knife be waved rapidly several times close to the insects, the effect of the acid is as if the knife had been dipped in strong ammonia, and the smell is sufficiently powerful to take away the breath for the moment.—*Francis Brent.*

Marine Aquarium. — Could any reader of Science-Gossip kindly give me some hints as to the formation and maintenance of a small marine aquarium in London, also as to where I could obtain my supply of water to start it with, as it would be inconvenient to bring it from the sea. —*J. G.*

Hedgehogs.—I have had several tame hedgehogs, and I always found that they would eat meat with avidity. They had the run of the garden, and they would generally come to the house in the evening for a piece of meat or a bone. One that I had for some time got very tame, and would readily take food from the hand. He would lick up milk or jam with great pleasure. We gave him a little box with hay in it, but he preferred to make a nest for himself, which he did among the ferns in the garden. His end, like that of many pets, was unfortunate—he was found drowned one morning in a tub of water in the garden.—*T.*

Communications Received up to the 14th ult.—F. J.—J. F.—T. L.—T. McG.—R. B. jun.—B. W. F.—J. L.—E. L.—E. H. G.—J. H. M.—C. E. L.—J. F. G.—H. W.—T. D.—C. C. U.—T. C.—J. W.—S. U. B.—T. W. H.—A. D.—A. W.—T. P.—T. J. W.—G. O. H.—C. P.—G. E. B.—A. W. L.—O. M.—G. S. T.—J. H. M.—W. H. H.—H. B. T.—J. D.—J. L. H.—H. M. J. U.—F. J. A.—R. T.—J. L.—W. H. W.—E. W.—W. S.—J. B. C.—J. W. R.—H. G. G.—J. R. S. C.—J. T.—J. G.—E. M.—J. E. B.—C. J. W.—J. F. C.—T. B. L.—R. T.—F. S.—B. T.—H. A. M.—L. A. W.—M. C. C.—T. B. W.—J. B W. R. T. S. W H. W.—J. W.—W. K. B.—H. D.—G. H. K.—G. I. J.—J. H.—H. S. D., &c.

NOTICES TO CORRESPONDENTS.

F. J.—The occurrence of vegetable remains in the chalk is exceedingly rare, and generally limited to fragments of wood. We have no doubt whatever that your supposed "sea-weeds," in flint (of which you send a sketch), are the dendritic markings of oxide of manganese. They are of common occurrence in cracked flints, as well as on the surfaces of the cracks in the harder chalk.

J. L.—See an article in SCIENCE-GOSSIP for February, 1872, on "How to Prepare Skeleton Leaves." It will give you all the information you require.

R. B., jun., reads us an editorial lesson on our remissness in not inserting his own communications. We assure him we shall be very glad to do so, when we get anything worth inserting. Our space obliges us to defer many paragraphs we would like to publish.

NAMING PLANTS.—We have received from "Miss H." a packet of above 20 species of plants to be named, some of them of the commonest forms. This is rather a *wholesale* attack upon editorial labour and patience, but *place aux dames!*

C.—Your specimen of microscopic fungus on the leaves of the Box is *Puccinia buxi*. See Cooke's "Handbook of British Fungi," No. 1514. Can you forward us a specimen?

F. BARNARD.—The specimens inclosed, of the groundsel leaves from Australia, are attacked by variety *d* of *Æcidium compositarum*. See Cooke's "Handbook," No. 1624.

J. W. RUSSELL.—The fossils are rather obscure, but those on the fragment of rock from Hastings appear to be *Cyrena media*, a common Wealden fossil. The chalk fossil from Eastbourne is only part of the impression of an *ammonite*.

C. J. W.—Iron-ore is not found in the Sussex chalk, that we are aware of, except, perhaps, as detached nodules of iron sulphite. A good elementary Mineralogy is published by Lockwood & Co. (Weale's series), at a low price; but your best plan would be to get Dana's "Student's Manual of Mineralogy."

SUB.—Perhaps you are not aware of our rule not to answer anonymous queries. We are obliged to adhere to this; and if you will put your query in the ordinary way, we shall be glad to answer it.

P. A.—We cannot undertake to return the specimens sent us to be named. They have frequently to pass from us to more competent judges, and we cannot guarantee their safety from accident or being mislaid. Those of our querists who have to await replies, must remember that we are obliged to consult the leisure of those gentlemen who are good enough to answer queries or name specimens.

T. ORAMS.—The *Hibiscus liliflorus* is a native of Bourbon, and was first introduced into this country in 1822.

W. S. E.—See a capital article in the *Popular Science Review* for January last, by the Rev. T. R. Stebbings, entitled "What are we to believe in Science—Teleology or Evolution?"

T. DYER.—The word *Octopus* should be accented on the *first* syllable—the practice of accenting it on the second is bad, and has no grammatical warrant. We do not see why you should not speak of this animal in the plural as "Octopuses." It is now thoroughly anglicised, and to use the plural "Octopuses" is as correct as to say "Elephants," or "Rhinoceroses."

T. R.—Cooke's "Handbook of British Fungi" is the best and most exhaustive of its kind published in any country. We know of no other introduction to the study of microscopic fungi than the work by the same author, published by Hardwicke, Piccadilly.

H. A. M.—1. The publisher of Gwyn Jeffrey's "British Conchology" is Van Voorst, Paternoster-row, London. It is in five vols. 2. You had better apply to the Hon. Sec. of the Folkestone Natural History Society concerning their "Guide to the Natural History of the Neighbourhood," and its price. Or perhaps some of our readers will take the hint, and send us the information.

J. GROVES.—For information respecting the Botanical Exchange Club, apply to H. C. Watson, Esq., Thames Ditton.

H. S. RICHARDSON.—You will find an account both of the Glass-rope sponge (*Hyalonema*), and investing *Polythoa*, in an article by Mr. F. Kitton, which appeared in SCIENCE-GOSSIP for February, 1872.

EXCHANGES.

EGGS of the Kestrel, Jay, Rook, Magpie, Garden Warbler, &c., for Lepidoptera or Pupæ.—Address, J. L. H., South-street, Reading, Berks.

WELL-MOUNTED and well-prepared Polycistina and rare Diatomaceæ, Springfield, Barbadoes, for diatomaceous material.—H. B. Thomas, Boston, Lincolnshire.

MICROSCOPIC SLIDES of Marine Algæ and Star-fish, also small unmounted Star-fish, for good Slides.—R. T. Smith, 25, St. Alban's-street, Weymouth.

DUPLICATES, Templi, and probably eggs of same, for distribution about the 20th March; send small box prepaid.—John Harrison, 7, Victoria Bridge, Barnsley.

FOR Palate of Limpet unmounted, *Patella vulgaris*, send stamped envelope, to Jas. Lumsden, 197, Dorwig-street, Wigan. Any Microscopic material acceptable.

A SUPERIOR Galvanic and Electric Apparatus for a Microscope.—J. W., Lindow-grove, Alderley Edge, near Manchester.

SPARTINA ALTERNIFLORA, for Lond. Cat. Nos. 154, 325, 429, 511, 621, 696, 697, 711, 871, 873, 958, 1149, 1176, 1181, 1225, 1372*.—J. Groves, 13, Richmond-terrace, Clapham-road, London.

A COLLECTOR of British Birds will be glad to exchange specimens with another collector.—Address, W. H. Hunt, Hendford, Yeovil, Somerset.

FOR beautiful Transparent Spines of *Echinus sphæra*, send stamped envelope and any Microscopic object of interest to John Butterworth, Goats, Shaw, near Oldham.

Helix obvoluta for named *Cyclades*.—J. E. Blomfield, Culvers-close, Winchester.

WANTED, a Geologist's Pick Hammer for a book entitled "Insect Architecture," nearly new.—T. B. Linley, 88, Blackfriars-road.

The Monthly Microscopical Journal, unbound, for 1869, in good order, open to offers.—F. T., Eaton Lodge, Rugeley, Staffordshire. Has any one a small printing-press to part with?

FOSSIL Diatoms, well mounted, for Selenites.—Thos. Lisle, Moorfields, Wolverhampton.

SEEDS: a few opaque slides of Portulaceæ, for other slides.—E. Lamplough, 17, English-street, Hull.

WANTED, *Limnæa glutinosa*, *L. peregra* (varieties), *Acme lineata*, offered for Foreign Marine Shells, or sundry British species.—A. W. Langdon, 4, Castle-Down-terrace, Hastings.

SEA ANEMONES, Marine Algæ. Fronds or Living Plants of 35 different Irish and Scotch ferns, *Gentiana verna*, *Neottia spiralis*, and several other interesting Alpine and native *Orchidea*. (Descriptive list sent for 3d.), for choice Alpines, Books, Papers, &c., on scientific subjects, &c. &c.—Terence McGann, Burrin, Oranmore, Ireland.

WANTED, vols. 6, 9, and 10, bound or unbound, of the *Monthly Microscopical Journal*, and Rabenorst's "Die Süsswasser Diatomaceen," for each of which I will give 18 well-mounted slides of Diatoms, all type Species.—B. Taylor, 56, Lowther-street, Whitehaven.

FOSSIL specimens of Rhizodus, Spirifera, Inoceramus, Terebratula, Leda, Nucula, &c., for mounted Diatoms, Foraminifera, &c.—L. A. Waddell, 36, N. Frederick-street, Glasgow.

Vertigo pygmacæa, var. *pallida*, for *Pupa ringens*, *Vertigo alpestris*, or *Vertigo antivertigo*, or *Clausilia Rolphii*, for *Limnæa involuta* or *Lucanea oblonga*.—J. Fitz-Gerald, West-terrace, Folkestone.

SEND stamped addressed envelope for the following hairs: Sea otter, land otter, roebuck, astracan, fox, tutch, mink, opossum, Russian sable, French sable, gill sable, American squirrel.—J. H. M., 17, Walham-grove, St. John's, Fulham, S.W.

Helix lamellata, *Zonites excavatus*, for *Vertigo antivertigo*, *V. alpestris*, *V. substriata*, *V. angustior*, or *H. fusca*, or *Acme lineata*.—J. Whitenham, Cross-lane Marsh, Huddersfield.

BOOKS RECEIVED.

"The Treasury of Botany." 2 vols. London: Longmans & Co.

"American Naturalist." December and January.

"Twentieth Annual Report of Brighton Natural History Society."

"Report of Lower Moseley-street Schools Natural History Society."

"Botanische Zeitung," Nos. 1 and 3.

"Reports of Eastbourne Natural History Society."

"Boston Journal of Chemistry." January.

"Journal of Applied Science." February.

"Grevillea." Edited by Dr. M. C. Cooke. February.

"Monthly Review of Dental Surgery." January.

"The Naturalist in Nicaragua." By Thos. Belt, F.G.S. London: John Murray.

"Organic Chemistry." By Dr. H. E. Armstrong. London: Longmans & Co.

"Microscopic Relations of Air." By D. Douglas Cunningham, M.B.

THE ORIGIN OF GREAT FIRES FROM A NATURAL HISTORY POINT.

AT a recent meeting of the Lower Mosley-street Natural History Society, I submitted a piece of leaden water-pipe, sent to me by Captain Drew, who received it from Mrs. Bakewell, St. Mary's Gate, in January last. It appears, Mrs. Bakewell's kitchen in St. Mary's Gate is infested with rats: they have, on several occasions, bitten through the water-pipe and flooded the place. The pipe has been twice bitten through, and the hole soldered up. The rats, no doubt, being thirsty, bit through the pipe to allay it. Two instances have occurred at Phillips's warehouse, Church-street; one in 1851, the other in 1856: in both cases the rats gnawed through a leaden gas-main-pipe a few inches above the floor. Other similar instances have occurred of rats gnawing a gas in mistake for a water-pipe: it has been thought that they heard the water bubbling in the gas-pipe, and have not found their mistake until they had penetrated the pipe. Phillips's warehouse was on both occasions damaged by fire through some of the employés seeking for the escaping gas with a light.

A fireman, in the performance of his duty, often meets with many curious and interesting instances of causes of fires, a few of which I will give, which you may, perhaps, think worth while to find a corner for in your very interesting Gossip on natural history, &c.

I have attended and traced several instances of fires occurring through rats and mice gnawing lucifer-matches. Matches are now dipped in paraffin wax instead of sulphur, as before; the rats or mice have carried them under the floor for the purpose of gnawing off the wax; in doing so their teeth have come in contact with the phosphorus at the ends, and so fired them. In 1856 I attended a fire at the Sultan's Palace at Scutari, Asia Minor. After the fire, I gathered from under the flooring a quantity they had been gnawing. Some years ago a fire occurred in London, caused through a jackdaw getting at a box of lucifers, and pecking them until it set them on fire.

Fires have occurred through rats and mice conveying under the flooring-boards oily and fatty rags, which have afterwards spontaneously ignited. This is rather a common cause of fires in cotton-mills.

The following is an extract from the Journal of the United Service Institution, Whitehall-yard, London, No. 52, for 1868: "One of the presents sent to the Museum of this Institution is a rat's nest and young. The nest was set on fire by a lucifer-match, ignited by the old rat as she worked it into her nest. Lieutenant A. H. Gilmore, R.N., states a fire occurred on board Her Majesty's ship *Revenge* from a similar cause."

Cats and dogs have caused fires in various ways; such as upsetting explosive and inflammable things into fires and lights, also through lying inside fenders and under fireplaces. Hot coals have fallen and adhered to their backs, which caused them to beat a hasty retreat, no doubt being anxious to get rid of the annoyance as soon as possible. They have sometimes succeeded by rolling or rubbing on carpets, curtains, beds, straw, shavings, and other inflammable things. The last instance I recollect occurred at a baker's shop in Albion-street, Gaythorn. A dog was lying under an oven fire, a piece of chip fell from the fire on to his back; he immediately ran to some shavings, rolled upon them, at the same time setting them on fire before the eyes of his master. In 1863, three distinct fires were caused in one room of a gentleman's house in Canonbury, Islington, through a cat lying inside the fender, when some hot ashes fell out of the fire on to its back, which caused it to rush about the room, when the cinders were deposited iu different places, which set fire to the carpet.

That mischievous animal the monkey has lent its aid to the devouring element. Fires have occurred through its ageucy, in a similar manner to cats and dogs, also through its playing with fire in various ways. In one instance a monkey upset a charcoal brazier, and set a room on fire. Many—yes, very many—fires have occurred through our domestics hunting bugs and other small fry by the light of a candle or lamp. In their anxiety, especially, to hunt fleas, they forget they may and have produced an enemy more to be dreaded. Many fires also occur through persons fumigating apartments to get rid of bugs and various kind of vermin.

A few instances have occurred through the concentration of the sun's rays upon glass fish-globes. On the 19th October, 1845, at two P.M., Mr. Philbrook's residence, Mill-street, Worcester, was set on fire through the concentration of the sun's rays upon a water-croft standing upon a table. Coloured bottles in chemists' shops, cracks, and bull's-eyes in glass have been known to focus sufficient heat from the sun to set buildiugs on fire.

Fires have occurred through the spontaneous ignition of pigeon's dung under the slates and tiles of houses. Professor Buckland traced two fires to this cause.—See *Builder*, 28th September, 1844.

Birds' nests under the eaves and wooden crevices of houses, have been frequently set ou fire through sparks from a neighbouring chimney, and have contained sufficient inflammable matter to set fire to the buildings.

Although I have given dogs the credit of producing work for the firemen, still it would not be fair if I were to omit to mention that they have frequently discovered and given timely notice of fires; and many au anecdote can be told of the very great interest dogs take in and at fires.

ALFRED TOZER.

Chief Fire-station, Manchester.

FOSSIL TEETH FROM THE NORTHUMBRIAN COAL-MEASURES.

DURING the last few months I have been examining microscopically all the teeth that are known and named as belonging to the upper or true coal-measures, and while pursuing these investigations, I alighted upon two teeth that were certainly quite new to me, and I am inclined to think they have never been discovered in any other locality, as I cannot find mention of similar or anything like similar teeth in Owen's "Odontography," Agassiz's "Poissons fossiles," or any other palæontological work to which I have access. One tooth resembles somewhat in shape and structure a tooth of the Selachian *Ctenoptychius*, though there are striking differences to be observed; the other has no ally that I can discover.

The first was sent to me as a specimen of *Ctenoptychius* by Mr. Salt, of Newsham, but a microscopical examination at once made it evident that it could not be a tooth of that fish, though probably belonging to the same family. It is very small, being rather more than half an inch in length, and one-fifth of an inch in height; the superior surface is convex and the inferior is concave; the edges are narrow and rounded, from the convexity being greater than the concavity. The superior surface is denticulated, but the denticles are not approximately uniform, as in *Ctenoptychius* (fig. 57),

Fig. 56. Vertical Section of New Tooth, nat. size.

Fig. 57. Typical Tooth of *Ctenoptychius*, nat. size.

but decrease rapidly to mere points (fig. 56). The four large denticles are rounded, and have on their free surfaces from two to three sharp shining points, the largest of these points being only $\frac{1}{33}$ in. in height. There is also a marked difference between the two teeth in the form of the base, as will be easily seen on comparing the above two engravings.

The minute structure also differs very much, so much, in fact, that it alone would cause the two teeth to be allotted to different genera.

In Ctenoptychius, the medullary canals are large throughout the whole body of the tooth, they do not become smaller as they approach the denticular surface, they branch and auastomose very freely, the branches being quite as large as the original canal; thus it is impossible to say whether the canals, as a rule, run parallel with the axis of the tooth (fig. 61). From all the canals spring numerous and very large calcigerous tubes, some of the largest measuring as much as $\frac{1}{1000}$ of an inch in diameter, the average being about $\frac{1}{4000}$ of an inch. The tubules which arise from the canals in the body of the tooth are very short, branch once or twice, the branches anastomosing with their neighbours, and they generally run at right angles to the canal from which they spring; but those that proceed from the canals near the denticles run parallel with the axis of the tooth, teud to a fasciculate arrangement, do not branch nor anastomose much, and retain the same diameter throughout their course uutil they are close to the periphery, when they become a little finer, but are still comparatively coarse tubes (fig. 63). The tubules can be easily observed under a power of 20 diameters. There is not a vestige of ganoine or fish-enamel in any of the sections in my possession, or in the sections that I have examined belonging to other collectors.

In the new tooth the canals in its base are quite as large as those in Ctenoptychius, but they become rapidly smaller as they proceed towards the denticular surface; the larger canals branch and anastomose freely, but less so when they become smaller: they all give off tubules, but very sparsely, with the exception of those near the first and second denticles, where the tubules are rather numerous (figs. 58, 59), are merely sharp points. The first four denticles have from two to three small points on their free surface: these are seen in figs. 58 and 59 to be composed purely of ganoine, each point of ganoine being continuous with its neighbour of the same denticle; but the enamel of one denticle is not continuous with that of the denticle next to it, except between the second and third. The middle points or denticles

Fig. 58. Vertical Section of Fig. 56, magnified 20 diameters.

and being the largest they are the only ones seen under a power of 20 diameters: the finest tubules require a power of about 400 diameters to resolve them. The calcigerous tubules are very fine, the largest measuring $\frac{1}{10000}$ in. in diameter, the average being $\frac{1}{15000}$ in.; they branch dichotomously, but seldom, and do not anastomose. The tubules in the body of the tooth run at right angles to the are also tipped with this fish-enamel; but beyond these the points are composed purely of dentine, the enamel, it may be, having been worn off. The fish-enamel, or ganoine, is permeated by calcigerous tubes, which are continuous with those of the dentine; they are similar in size to the dentinal tubules, but appear larger, and therefore more distinct, by force of contrast with the clear substance in which they

Fig. 59. Vertical Section of Tooth (fig. 56) continued, × 20.

canal from which they arise, while the denticular tubules proceed parallel with the axis of the tooth, with the exception of those in the first denticle, at the base of which they run at right angles to the axis, becoming vertical towards the apex (fig. 60). The denticles, as I have already said, rapidly decrease in size, from one side to the other, till they ramify (fig. 60). The largest point of enamel is only $\frac{1}{300}$ of an inch in height.

The second tooth was found in 1868, lying embedded in shale, and is the only one in my possession. On account of its shape being unlike that of any other tooth that I am acquainted with, a section was made in order to ascertain its structure under the microscope, and also in the hope of obtaining by this means some clue to its family or genus. The section showed very evidently that the tooth was a new one, that it belonged to the class of fishes, and if one could judge from such small data as a single

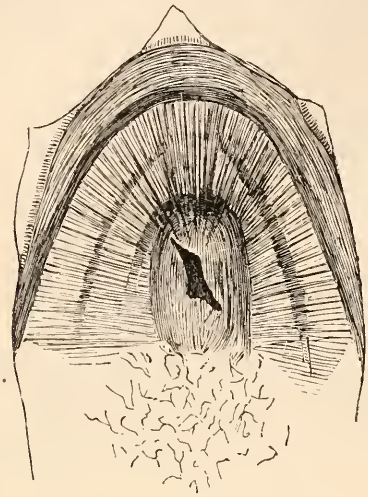


Fig. 60. Vertical Section of largest denticle, × 80.

tooth, that it was a Selachian; for no long tissue is attached to its base, and it was clearly not inserted in a socket. The tooth is very small, being only $\frac{1}{12}$ in. in height and $\frac{3}{50}$ in. in breadth: its shape is that of a shortened cone, the point being slightly

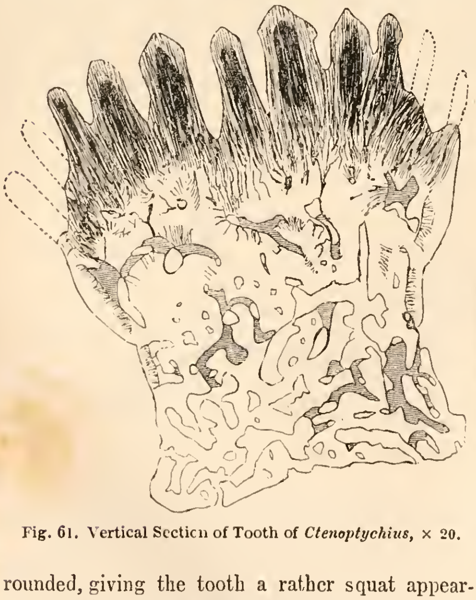


Fig. 61. Vertical Section of Tooth of *Ctenoptychius*, × 20.

rounded, giving the tooth a rather squat appearance. Microscopical examination shows that it is composed of unvascular dentine, with a layer of enamel all round the free edge. The pulp-cavity proceeds $\frac{1}{20}$ in. up the tooth. At its commencement it is very broad, stretching from enamel to enamel; but as it passes up the tooth it rapidly contracts, so that when it has proceeded $\frac{1}{40}$th of an inch, the cavity is only $\frac{1}{66}$ in. broad: from this point it gradually becomes narrower. The dentine varies in its thickness according to the shape of the pulp-cavity. The tubules which ramify in it are very numerous and exceedingly fine, varying from $\frac{1}{20000}$ in. to $\frac{1}{30000}$ in. in diameter; they do not branch or anastomose except when close to the periphery, some of the branches being so fine that I cannot measure them. The tubules spring from the pulp-cavity and proceed in straight lines; their

Fig. 62. Vertical Section of two denticles of *Ctenoptychius*, × 80.

course is parallel with the axis of the tooth, and those that arise from the sides of the cavity have a slight tendency outwards. The enamel borders the whole of the free edge of the tooth; at the base it is unsupported by the dentine, and forms one of the boundaries of the pulp-cavity; its average thickness is $\frac{1}{100}$ in.: no structure can be detected, although I have examined it under a power of about 600 diameters; nor do any of the dentinal tubules pass into it, as is generally the case in fish-enamel.

Until I am more certain that these are really newly-discovered teeth, I shall not attempt to name or classify them, for I do not wish to commit the error that some distinguished palæontologists have fallen into, of founding new genera upon single teeth, without knowing whether collectors in other districts have discovered any similar to them. In all coal districts there are many collectors of fossil remains, who, in their searchings, often find teeth, bones, &c., the descriptions of which are not published in books or periodicals, and it may be that they are allowed to be forgotten from want of knowledge as to their worth. I am sure that if some well-qualified palæontologist were to spend a few months in visiting all the pit districts where fossils are known to exist, and in examining the specimens in the possession of the local palæontologists, and of some of the more intelligent pitmen who are to be found in many of the colliery villages (many of these pitmen have excellent collections—for instance, Messrs. Simm and Taylor, of Cramlington, and Mr. Salt, of

Fig. 63. Vertical Section of New Tooth, × 20.

Newsham), he would find much that would clear the way for a better knowledge of the fishes, reptiles, &c., already known, and much that would be entirely new to science. It is the scattered way in which these researches are undertaken, and the want of a systematic work illustrating and describing all the latest discoveries, that render the study of the fossils of the carboniferous strata so difficult and unsatisfactory. Agassiz's "Poissons fossiles" is certainly a splendid work, but it contains much that is now known to be incorrect, and nothing of the discoveries of the last twenty-eight years. Owen's "Odontography" is excellent as far as it goes, but it is also much in arrear of our present knowledge. The late Professor Agassiz evidently saw the necessity for a work in which the latest discoveries should be described and classified, for in a letter which he wrote to Sir P. de M. Grey Egerton just before his death, he lamented the want of time to pursue investigations into the fossil teeth of Selachians. If he had been spared to make these researches, it was his intention to have published the result as a continuation of his "Poissons fossiles." Such a work, comprising only Selachian teeth, would leave a large field to be inquired into; viz., the teeth of ganoids, labyrinthodonts, reptiles, and mammals. But as the Professor has been removed before he could prepare this work, the whole field of Odontography is open to other inquirers.

W. J. Barkas, M.R.C.S.E., &c.

THE HISTORY OF OUR COMMON CULTIVATED VEGETABLES.

By H. G. Glasspoole.

No. I. The Potato.

In the following pages I purpose to give an historical account of those vegetables which are in common use among us, and may be classed as some of the necessaries of life.

When the Romans invaded England, we are told by their historians, they found the natives supporting themselves on the rudest fare,—uncultivated roots and wild fruits. This must be rather an exaggerated account, as no doubt the brave inhabitants who opposed Cæsar and his legions fed upon the flesh of animals taken in the chase, and which at that period abounded in this country. The Romans we know, from the works of Pliny, Columella, and others, were famous for agricultural and horticultural pursuits. The market-gardens around ancient Rome were cultivated by the chief men of the city, who were also the proprietors, and they themselves tilled the ground with their own hands. To this nation we undoubtedly owe much of our present civilization, for, amidst all their conquests, they never forgot to carry forward the useful arts of life; and the remains of their beautiful and extensive villas, which every now and then are discovered under our soil, show us plainly that they did not neglect to introduce, even to this their distant possession, some of the comforts and gratifications of their luxurious city. When the Romans left our shores, the country was given over to the ravages of the Saxons and Danes, who kept up almost a constant warfare with the inhabitants, so that agriculture and the other sciences of a civilized race gradually disappeared.

There are many excellent roots and nourishing herbs indigenous to Britain, but as the art of cultivating these was unknown, they could not have had that nutritious character they now possess. Many of the fruit-trees and plants introduced by the Romans were never altogether lost, but became degenerated for a time, until restored in after-years by the monks, those constant guardians of horticulture.

We have no works on plants in English before the sixteenth century. In 1552 all books on geography and science in this country were ordered to be destroyed, being, as it was supposed, infested with magic. So it is almost impossible to know much about the state of gardening before the reign of Henry VIII. Harrison, who wrote "A Description of England," mentions that "herbs, fruits, and roots, such as yearly grow out of the ground, were very plentiful in the reign of Edward I. and after his days, but in process of time they were neglected; so that from Henry IV. to the beginning of the reign of Henry VIII. there was little or no use for them in England." But it is most likely in those days the constant wars between the houses of Lancaster and York prevented persons turning their attention to anything like horticulture.

During the reign of the last-mentioned monarch rapid strides were made in horticulture—the surgeons and apothecaries began to cultivate medicinal herbs; but Hume the historian says it was not until the end of Henry's reign that any salads, carrots, turnips, or other edible roots, were produced in England: all such vegetables were chiefly imported from the Netherlands, and were very dear; for it is stated that in 1595 a sum equal to 20s. was paid at the port of Hull for six cabbages and a few carrots. In the sixteenth century a cabbage from Holland was deemed an acceptable present.

The inhabitants of Flanders and the Low Countries were very industrious God-fearing people, and had long been famous for their horticulture.

About 1524 a cruel religious persecution drove numbers from their country, and they came to England, where an asylum was offered them. Many settled at Sandwich, and soon discovered the suitability of the soil for gardening, which, after a short time, enabled them to supply the country round with plenty of vegetables, and at a more reasonable price. The demand for their produce in London was so great that a body of the exiles were induced to remove nearer the metropolis, and they settled at Battersea, Bermondsey, and Wandsworth, where many of the garden-grounds planted by them flourish to the present day.

Since the reign of Elizabeth horticulture has steadily progressed in all its branches, and those vegetables which were once a luxury confined to the tables of the rich, have now become a necessary with the poor.

The most important class of roots that first demands our attention is the Potato; and the history of its discovery and culture affords us an interesting example of progress under difficulties, as for some time after its introduction it was undervalued and its cultivation neglected by the scientific and practical gardeners of those days. The discovery of America by Columbus, which had aroused the spirit of maritime adventure and the thirst for foreign dominion in Europe, at last infected our country, and in 1584 Queen Elizabeth sent out a fleet "to discover and plant new countries not possessed by Christians," under the auspices of Sir Walter Raleigh. Thomas Heriot, the mathematician, was one of these adventurers: he, with the rest, returned home within two years, and it has been supposed that to him we are indebted for the first knowledge of the potato, which he describes, under the article of Roots, as an American plant called *openawk*. "The roots of this plant," says he, "are round, some as large as a walnut, others much larger; they grow in damp soils, many hanging together as if fixed on ropes. They are good food either boiled or roasted."

From numerous passages in the Elizabethan dramatists, it appears that the potato was a great dainty in those days; but this refers to the sweet potato (*Batatus edulis*), which was cultivated in Spain and Portugal and imported to this country. It is to this plant that Shakespeare alludes in the "Merry Wives of Windsor" (Act v. Sc. 5), where Falstaff says—

"Let it rain potatoes, and hail kissing comforts!"

Gerarde mentions in his Herbal, published in 1597, the common potato as *Battata Virginiana*, having received the roots from Virginia, which he cultivated in his garden, and gives an accurate description of both the plant and flower. He recommends the root to be eaten as a delicate dish, and not as common food.

The introduction of this root into Ireland by Sir Walter Raleigh is well authenticated, for it is stated in the manuscript minutes of the Royal Society that S. R. Southwell mentioned to the fellows that his grandfather was the first to cultivate the potato in that country, and for this valuable root he was indebted to Sir Walter. Among the anecdotes related of Raleigh is, that on his returning to his estate at Youghal, in the county of Cork, he gave some of the roots of the potato to his gardener, desiring him to plant them in the spring. In August these plants flourished, and in September produced fruit, but so different to the gardener's expectations that in an ill humour he carried the potato-apples or berries to his master. "Is this," said he, "the fine fruit from America you prize so highly?" Sir Walter either was, or pretended to be, ignorant of the matter, and told the gardener, since that was the case, to dig up the weed and throw it away. The gardener obeyed, and in rooting out the weeds found a bushel of potatoes.

Dr. Campbell, in his Political Survey, states that this plant was not introduced into Ireland until the year 1610, while other writers affirm that it was grown there at a much earlier period, and indeed try to make it equally probable that it is a native vegetable of the country. It is known, however, that Captain Hawkins carried the Spanish potato to Ireland in 1565. The claim to its greater antiquity in that country was made by Sir Lucius O'Brien, who stated to Mr. Arthur Young, that the venerable Bede mentioned this plant as being in Ireland about the year 700; but there is no passage in Bede's works that would prove such an assertion; and largely as the potato is cultivated in that country, it has not yet made out its title to a place in the indigenous flora of Ireland. It appears to have been cultivated and its value appreciated in that country long before any notice of it was taken in England; for, some time after its introduction, it was planted only in the gardens of the nobility as a curious and rare vegetable.

The potatoes furnished to the table of the queen of James I. bore the high price of 2s. per lb., and through the succeeding reign and Commonwealth it remained extremely scarce, nor did its cultivation spread till more than a hundred years after the discovery of Virginia.

In 1663, Mr. Buckland, a Somersetshire gentleman, drew the attention of the Royal Society, by letter, to its value in case of famine, and such members as had lands adapted to its culture were entreated to plant the new vegetable; and Evelyn, the celebrated practical gardener of that period, was requested to notice the subject at the close of his Sylva; but so little was he aware of its importance, that he took no notice of it till thirty years afterwards, and then in rather slighting terms. In his "Kalendarium Plantarum" (the first gardeners' calendar published in Britain) he writes thus:—"Plant your potato in your worst ground. Take them up in November for winter spending; there will enough remain for a stock, though ever so exactly gathered." In Mortimer's "Gardener's Kalender" for 1708 the potato is directed to be planted in February; and it is added: "The root is very near the nature of the Jerusalem artichoke, although not so good and wholesome; but it may prove good to swine." A writer at the end of the seventeenth century admits that "potatoes are much used in Ireland and America as bread, and may be propagated with advantage to poor people."

Woolridge, who wrote in 1687, describes potatoes as being very useful in "forcing fruits," stating that they are planted in several places in the country to good advantage. He adds, "I do not hear that it has been yet essayed whether they may not be propagated in great quantities for the use of swine and other cattle." The celebrated Ray, who published his "Historia Plantarum" in 1686, takes no further notice of this vegetable than by saying that it is dressed in the same manner as Spanish batatas. Lisle, who wrote on husbandry from 1694 to 1722, is wholly silent about the potato, and so are the eminent nurserymen Loudon and Wise, in the seventh edition of their "Complete Gardener." Bradley, who wrote about 1719 very extensively on horticultural subjects, makes only a passing note on this vegetable. "They are," he says, "of less note than horseradish, radish scorzoners, beets, and skirret; but as they are not without their admirers, I will not pass them by in silence." The first district of England where the potato was cultivated was on the western coast in Lancashire, at North Meols, about the year 1694: with this exception, its progress continued at an extremely slow pace. In 1760 it was known only in Yorkshire as a garden plant, and in Somersetshire we must date its introduction as an article of farm produce at least ten years later.

After this period, however, the value of the potato came to be very generally appreciated, and in the year 1796, in the county of Essex alone, no fewer than seventeen hundred acres were planted with this root for the supply of the London market.

The introduction of the potato into Scotland was probably earlier than any part of England, with the exception of Lancashire, for the name of this plant is mentioned in the "Hortus Medicus Edinburgensis," published by Sutherland in 1683, but perhaps only grown as a curiosity in some of the gardens about Edinburgh; and it was not until the year 1728 that it became an object of useful cultivation in the country. The Scotch are indebted to a labouring man named Thomas Pentrice for the more extensive cultivation of this root. He resided near Kilsyth, in Stirlingshire, and cropped the little plot of ground from which he drew his subsistence with potatoes. This crop proved extremely valuable, and was almost instantly in demand for propagating other crops, first among the cottagers, and then among the farmers. Pentrice continued to cultivate this root very carefully, and to supply his neighbours with the produce. After a few years he found himself in possession of two hundred pounds; this he sank in an annuity, at a good interest, upon which he lived independently to an old age. The last years of his life were spent at Edinburgh, where he died in 1792 at the age of eighty-six, having thus been for sixty-four years a witness to the happy effects of the blessing which he had been instrumental in conferring on his country.

For some time, it appears that the cultivation of the potato was confined to the cottagers and small farmers of Scotland, but it found no favour with the higher classes; indeed, some of the Scotch were hostile to the use of this root on religious grounds. "Potatoes," said they, "are not mentioned in the Bible." Thus the same anathema was pronounced against them as against the spinning-wheel and the corn-farmers.

The year 1742, which was long remembered in Scotland as the "dear year," gave an impulse to the cultivation of the potato, and indeed to the whole agriculture of the country; so that during the latter half of the eighteenth century the practice and science of husbandry made much more rapid progress in Scotland than in England.

But in some parts of the country, as late as 1756, they appear to have been unknown. There is an anecdote told of a lady of Wigtonshire bringing some potatoes in her pocket to church to present to a friend as a rarity, but the string of her pocket breaking as she was in the act of going out, on the dismissal of the congregation, she lost her burden in the passage, the contents of which created considerable speculation. We have no records of the early practice and progress of potato husbandry in Ireland; but towards the end of the seventeenth century, we are informed by Houghton, in his "Collections on Husbandry and Trade," that during the wars of that period, when all the corn was destroyed by the plundering and pillaging of the soldiery, the potato crop seemed, in a great measure, to supply the inhabitants with food, for he observes, "unless the soldiers had dug up all the ground where potatoes grew, and sifted it, they could not have extirpated them."

These facts and extracts serve to show how, by what gradual and almost imperceptible steps, this most valuable root has been brought to its present state of perfection, for there can be indeed but little doubt that the imperfect modes of cultivating and cooking the potato were, in a great measure, the cause which prevented its more speedy adoption as a wholesome article of food.

It is related by a person who was invited to taste the first potatoes grown in Forfar, that the roots had been merely heated, and that they adhered to the teeth like glue, while the flavour was far from agreeable. The food was about to be condemned, when a gentleman, who had tasted the potato in Lancashire, accidentally arrived, and caused the rejected roots to be put back into the hot turf-ashes, till they became as dainty as they had before been nauseous.

(*To be continued.*)

"TURNTABLES" AND "MOUNTING."

THERE are few microscopists who, from being unable to prepare their own slides, have to put up with purchasing such at the dealers', but meet with the annoyance every now and then of the cells or covers giving way; and although they may go to the unlucky vendor and complain, and perhaps have them exchanged, yet it is touching an innocent party on a tender point, while the real culprit may have the good luck to escape scot free. It would seem to be a very simple and easy matter to cement two pieces of glass together with an intermediate ring of some sort or other to hold them apart for the reception of the object; but in practice there are so many obstacles to contend against that it is by no means so easy of accomplishment as might be expected, and scarcely any of the uninitiated would be able to form any adequate conception of the amount of anxious care and forethought that has been expended upon such a seemingly trivial affair; and yet, in spite of all ordinary care, failures will sometimes occur, although it is probably owing as much to defective means as to want of care. The first great obstacle to be considered is the effect of expansion and contraction, or the different degrees of expansibility among the various substances employed; for even if the cell itself be also of glass, the contents of the cell, whether air or fluid, expand in a different ratio to the glass, and thus tend to loosen the cell or the cover from its attachment, to the detriment of the mounting. An apparently obvious remedy against these results would be to make use of a softer and more tenacious cement, such as would admit of this contraction and expansion without becoming detached; but, unfortunately, another evil then makes its appearance in the shape of "air-bubbles" and "running in" of the cement, so that a certain degree of consistence as well as adhesiveness is essential to success. The composition of these cements, however, must be left for some future opportunity, as the immediate object of the present communication is to call the attention of mounters, both amateurs and professionals, to one other serious defect that is quite within their power to remedy without putting themselves to any great cost or inconvenience in so doing.

Whatever may be the materials of which a cell is composed, or may be put together with, it is indispensable to its security that the outside shall be well coated over with some protective composition, whether it be ornamental or plain, and in the case of fluid mountings it is desirable to repeat this external varnishing at intervals, as a precautionary measure of safety—hence, for this purpose a "turntable" becomes a necessity; but as cells are very rarely fixed in the middle of the slide, or any two of them in the same relative place, the latter defect involves an unnecessary amount of trouble and inconvenience, besides a very serious loss of time, through having to centre each slide separately, which, by a little better arrangement of the turntable, may be easily avoided for the future.

Glass slips are intended to be exactly one inch wide and three inches long; but as there is often a variation of a tenth of an inch or more in both length and width, it becomes evident that any mode to be universal must admit of compensation in this respect; therefore the only possible plan is *to make two sides only of the parallelogram available to measure from*, and which is, fortunately, the easiest plan to put in practice. The annexed sketch, half the size of the original, represents the principal wheel of a turntable I constructed about twenty years ago, and which has been in use ever since without having ever given rise to a feeling that any further improvement could be made, seeing that it is capable of effecting very satisfactorily all that can be required of it. The wheel is formed out of a brass pulley about three eighths of an inch thick, having a groove around its circumference to receive a large gut band by which it is rotated. The screw-head and washer in the centre are sunk below the level, in order to avoid the lubricating grease getting on the slides, while the whole surface has been made as true as possible. The two pins B and B support the slide exactly half an inch from the centre, while the pin A stops the slide at exactly an inch and a half from the right-hand end: the slide being pressed firmly down by the spring above, is thus kept in its position, and is prevented from shifting during use. It is here apparent that all deviation from the standard inch by three inches will present itself at the sides D and E, where it will not interfere with the centring, nor can it be sufficient to be in any way detrimental to appearance. The preceding may be taken to represent the normal arrangement of the table, but when required

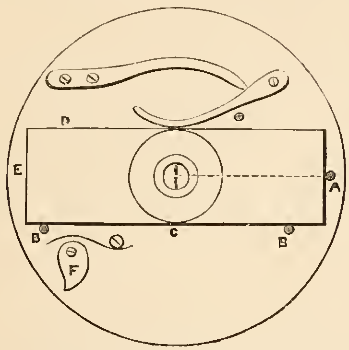


Fig. 64. Wheel of Turntable, ½ nat. size.

for accommodating misplaced cells, the two pins A and B require to be taken out, when the end of the slide E falls down upon the "cam" F, which is a screw with a flat eccentric head of the form shown, the thin line indicating a piece of mainspring for greater steadiness. Then by turning the screw F and pushing the slide to the right or left, any cell or mounting may, with a little practice, be readily brought into the centre; when it will be firmly held by the spring above it. This centring may be greatly facilitated by having a few circles made on the brass surface of the wheel beneath the slide.

The foregoing adjustments may be very readily obtained in the following manner. First, describe a circle *one inch in diameter* in the centre, by rotating the table on its own axis. Next, draw a line quite across, *just touching the outer edge of the circle*, and let the holes for the two pins be drilled, not *on* the line, but just so much below *as will bring the edge of the holes up to the line* as accurately as possible. Lastly, as the radius of the circle is just half an inch, another inch beyond this circle will give the exact distance for the line and pin A, equal care being taken to have the latter beyond and up to the line, but not on it. Now, if every turntable were to be readjusted to this standard, namely, one and a half inch from the right-hand end and half an inch above the lower edge, slides and turntables would be rendered as interchangeable as modern stands and object-glasses have become through the adoption of the universal screw.

But it is not for "cells" alone that this centring is here pleaded; it is equally desirable that *every object*, even in balsam or dammar, or in any other medium, should be so placed that its cover may be cemented down for greater security, and which may readily be done in a very simple manner. Having placed the slide in its position, draw upon it a circle, with ink, as large as the slide will admit of, as at C, making a dot opposite A for future guidance. (I use "Draper's dichroic ink," because it flows freely, is a brilliant black, and does not corrode or clog steel pens; but its greatest merit for this purpose is, that when thoroughly dried the glass may be afterwards cleaned with spirit of wine without disturbing it, yet it may be removed by the slightest touch of a piece of wood wetted with *liquor potassæ:* it may be had of almost any stationer at sixpence the half-pint bottle.) Having made the ink circle on the *upper* side of the glass, then with a pair of compasses, make a similar circle on a piece of cardboard; when dry, turn the glass over with the ink circle next the card, placing the two circles concentrically, and mark a dot or small ring around the central spot indicated by the point of the compass, or a second glass slip marked with a ring and central dot may be used instead of the card. This latter central spot will now be exactly under the spot corresponding with the centre of the turntable, and over which the object should be placed, the large circle being left till the last, as a guide for the final centring of the cover before completion.

W. KENCELY BRIDGMAN.

AMONG THE ANDAMANS.

IN the Bay of Bengal, between the 10th and 14th parallels of north latitude and the 92nd and 94th degrees of east longitude, lie the beautiful tropic islands of the Andamans, known to us since the Indian mutiny chiefly as a penal settlement, but latterly painfully associated in our minds with the mournful tragedy enacted there on the 8th February, 1872.

The Andamans proper consist of four large islands and a multitude of smaller ones, mostly covered with luxuriant forest, and almost everywhere locked in a fringe of coral, which in many places forms extensive reefs, usually so steep and sudden as to be most dangerous of approach. The three largest, called respectively North, Middle, and South Andamans, are only separated from each other by narrow straits, which are not navigable at low water; and hence they commonly bear the one general designation of Great Andaman, in contradistinction to Little Andaman, the name given to the southernmost of the four, which is divided from the others by the broad, deep channel of Duncan Passage.

The larger islands of the group are said to possess many good harbours and anchorages, as well as an abundance of fresh water,* but very little is known about them, as they are not often visited, chiefly, I imagine, in consequence of the danger of their coral reefs and the inhospitality of their inhabitants, a woolly-headed, savage race, whose origin has been for some time, and is still, I believe, a puzzle to ethnologists.

Nature has everywhere scattered her beauties over this region with a lavish hand, and some of the smaller rocks and islets are said to be lovely as a fairy dream.

Many years ago† the Honourable East-India Company formed a settlement at Port Cornwallis, a noble harbour of the north island, but it was soon afterwards‡ abandoned on account of its extreme unhealthiness, and, since then, until the establishment of the present penal colony at Port Blair, where the interest of the group is now centred, the Andamans were left to the unrestrained dominion of wild and unfettered nature.

Port Blair is a large, irregularly-shaped bay or inlet at the south-eastern end of the Great Andaman, indenting the coast to the westward, and then bending downwards to the south. Within it are most of the settlements of the colony, but the chief station is the little island of Ross, which lies athwart the entrance of the harbour, and, notwithstanding its small size, contains nearly all the principal public buildings, including the church, Government House, and the barracks.

Ross Island is a somewhat bold and rather picturesque triangular mass of rock, consisting, according to Mr. Ball,§ of bluish-grey limestone, with interbedded layers of argillaceous shales, rising at its highest point to 195 feet above the sea, and covering an area of about one-third of a square mile; its length being nearly 1,700 yards, and its greatest breadth—in the centre, where it runs out abruptly into a long, projecting point—rather less than the same number of feet. Mr. Ball remarks that, owing to the great inclination of the strata, and other causes, there is considerable risk of destructive landslips; and if some precautionary measures are not adopted, the eventual stability of the island itself may be endangered, by the removal of stones from the face of the cliff for building purposes, and the disintegration of the exposed surface by the sea and other natural influences.

The indigenous vegetation of Ross has almost entirely given place to ornamental and useful plants, introduced from India, the Malayan Peninsula, and the larger islands. Amongst the trees are cocoa-nut palms—which have probably been brought from the Cocos, as they do not appear to be anywhere natives of the Andamans proper—oranges and lemons, with other species of *Citrus*; the Bullock's-heart (*Anona reticulata*), custard-apples (*Anona squamosa*), guavas (*Psidium pomiferum et pyriferum*), acacias of two or three kinds, including the fragrant *A. farnesiana*, *Agati grandiflora*, *Cassia fistula*, the Mango (*Mangifera indica*), the Plantain (*Musa paradisiaca*), and the Durian (*Durio zibethinus*). There are also numbers of small and beautiful trees of *Mesua ferrea*, a noble and gigantic *Calophyllum inophyllum* near the Commissariat office, and, round the coast, occasional fine specimens of the common screw-pine (*Pandanus verus*). Besides these, many flowering plants and a number of so-called weeds, with ten or twelve species of grasses, have followed the footsteps of settlement and cultivation, all of which seem to thrive and flourish in the genial climate of this surf-lashed outlying sentinel of Port Blair.

Peacocks of both species (*Pavo cristatus et muticus*), as well as the common Indian crow (*Corvus splendens*, *Estrelda amandiva*, *Acridotheres tristis et fuscus*, and *Palæornis torquatus*), have been introduced since the formation of the colony; but the amaduvats have disappeared, and the prevailing form of *Corvus* now seems to be *C. andamanensis*, though *C. culminatus* is also found.

Various genera and species of fishes—many of them brilliantly coloured—are abundantly represented in the blue waters of the bay; and rare and beautiful creatures constantly reward the researches of the malcologist, even on the shores of Ross itself; but my personal experience does not extend to either of the branches of natural science which include these denizens of the deep, and I must refer those desirous of information on both points to the papers scattered over the Journals of the Asiatic Society of Bengal, and Surgeon-Major Day's article on the Fishes of the Andaman Islands, in the Proceedings of the Zoological Society of London for 1870.

The sea was curling up into white-lipped wavelets one day in the beginning of November, 1871, when, accompanied by a brother officer, I crossed the bay *en route* to Mount Harriet, a hill overlooking the harbour, and easy of access from Hope Town, which is a little native village situated in a cove to the

* Rosser and Imray's "Sailing Directions."

† 1791. ‡ 1796.

§ "Journal of the Asiatic Society of Bengal," xxxix. 232.

westward of Perseverance Point, and nearly opposite to the settlement of Chatham. As we left the jetty at Ross, the dark nimbus clouds which had obscured the morning began to break and give place to a fairer sky, and ere we had completed half our voyage, the truant sun peeped out upon us, and shed such a magic light around, that the superb land-locked inlet, with its picturesque islands and wooded shores, seemed all aglow with gold and amber, while the white breakers dashing over the coral reefs, and gathering force and grandeur at every fresh breath of the sea-breeze, lent such an additional charm to the rich green forest, still dripping and sparkling with pendent rain-drops, that the scenery attained an almost ideal beauty, impossible to describe.

The distance across the bay is rather more than three miles, and it was about eleven o'clock when we landed at Hope Town, on the still unfinished pier, which scarce three months later earned such a melancholy celebrity by the assassination of Lord Mayo.

After a short delay at the village, until the servants arrived with our supplies of food and other impedimenta, we commenced the ascent by a very good bridle-road of thirteen furlongs in length, which climbs easily and pleasantly through a beautiful virgin forest to the commissioner's bungalow upon the summit of the hill, 1,185 feet above the level of high tide. Nothing can be more charming than this pathway, winding, as it does, amidst the profuse and irrepressible vegetation of the tropics, and vocal with the many strange and singular sounds with which creation speaks in these voluptuous latitudes. Noble trees of great height, and remarkable for their huge buttressed trunks, stand all around like mighty sentinels, and cast grateful shadows from their green canopy of foliage over much of the ascent, tempering the heat and affording shelter to hundreds of gay and often sweet-voiced birds and marvellous insects, which make their home amidst these vast storehouses of nature; while clinging to the giant stems and round the great spreading arms of the patriarchal trees, are myriads of parasitical and climbing plants, rejoicing and luxuriating in the moist warm climate, which, though almost free from the oppressive sultriness of the calm regions, possesses much of that fervent life-giving humidity so characteristic of the equatorial zone.

It is not the least of the attractions of this delightful roadway, that in its immediate vicinity a beautiful brook comes dashing down the mountain-side from a perennial spring near the summit, and after a sparkling and rapid journey, falls into the bay near Hope Town.

Escaping a drenching shower on the way by the opportune occurrence of a sheltering rock, we reached the summit of the hill in due course of time, and, taking possession of the Commissioner's house, regaled ourselves with cool draughts of magnificent milk, which appeared to be the only purchasable article within reach, notwithstanding that a considerable portion of the extensive clearing round the bungalow was devoted to the cultivation of vegetables of different kinds. Other houses, inferior in size and aspect to that which we had temporarily appropriated, combined to form a sort of village in this charming locality, which seemed to rejoice in a most cool and pleasant climate, and afforded us such a view as is rarely seen even in the tropics. The panorama unfolded by our elevation embraced a vast extent of sea and land, including Rutland Island and Macpherson's Straits, as well as some of the lofty elevations of the North Andaman, which culminate in the Saddle Mountain, visible at sea sixty miles away, and estimated to be 2,400 feet in height. Almost below us lay the beautiful harbour of Port Blair, with its various rocky islands, and stretching away to the southward, the forest-fringed lagoons leading to Port Mouat.

Mr. Ball, whose interesting paper on the geology of the vicinity of Port Blair* I have already quoted, states that the principal rock of Mount Harriet is a coarse yellowish-green or grey sandstone, apparently very absorbent of water; also that close to the top of the hill the sandstone appears in vertical beds, but that on the ascent the rocks are much obscured by humus.

During the alternations from gloom to sunshine which the moving clouds so frequently created, the effects of light and shade upon the extended landscape open to our view were exceedingly beautiful, and sometimes so wonderfully rapid and complete as to be almost startling. In a single instant it seemed as if the forest changed from a brilliant combination of vivid greens to a solemn and uniform heavy-looking, almost blue tint, while perhaps, after the lapse of a few seconds, it would suddenly reveal itself again in all its former sunny brightness. The luminous play upon the water under these conditions, though perhaps not quite so striking, was even more lovely still,—now presenting to our gaze a sapphire sea, and anon passing quickly to chrysophraze and emerald, to flash back upon us next moment with an intensity of blue rivalling the deepest azure of a southern sky.

There were scarcely any flowers in bloom, excepting orchids, which seemed to be chiefly representatives of various species of *Dendrobium*, but they were all out of reach, and I did not procure a single specimen. Many of the trees were unknown to me, but in the forests I recognized a few that I was familiar with; amongst which were *Dipterocarpus lævis*, *Mesua ferrea*, and *Pterocarpus dalbergioides*. There was also a tree with brilliant red decaying

* J. A. S. B, xxxix. p. 231.

leaves, so like *Terminalia catappa*, that I have no doubt of its having been *T. procera*, as mentioned by Mr. Kurz;* an *Acacia* in tolerable abundance, and a *Lagerstrœmia;* also in the lower and denser forest extending down to the beach, *Sterculia fœtida* and a gigantic *Dillenia*, which was probably *D. pilosa* of Roxburgh. I met with no tree-ferns of any kind, and scarcely any palms, excepting a prickly climbing *Calamus*, which was very common, while the great pendulous lichens, such as I have seen adorning the damp forests of the eastern Himalaya in profuse quantities, were altogether absent. *Pothos scandens*, however, another characteristic plant of the moist Himalayan woods, was everywhere plentiful and luxuriant. Mangroves abound in some places, fringing the shore with their brilliant green foliage and growing upon them. One of my friends found large quantities of *Orchidaceæ*, chiefly species of *Dendrobium* and *Pholidota*.

Of birds, we obtained specimens of a beautiful parrakeet (*Palæornis nicobaricus*) which seemed very abundant, but generally kept well out of reach of shot in the upper branches of the great trees; of the peculiar-looking black woodpecker (*Muelleripicus Hodgii*), and some of the Indian green imperial pigeons (*Carpophaga sylvatica*). We saw also a good many bulbuls (*Otocompsa jocosa*) and sunbirds (*Nectarinia pectoralis*); a *Pericrocotus*, which was most probably *P. peregrinus;* and a few others which I failed to identify. A small collection, however, made by a brother officer on Mount Harriet, and in the forests stretching downwards to the sea-beach, furnished me with the following species:—

Palæornis erythrogenys, Myth.; *Centropus andamanensis*, Tytler; *Macropygia rufipennis*, Blyth; *Chalcophaps indicus*, Linn.; *Osmotreron chloroptera*, Blyth; *Pericrocotus peregrinus*, Linn.; *Loriculus vernalis*, Sparm.; *Irena puella*, Lath.; *Oriolus andamanensis*, Tytler; *Merops quinticolor*, Viall; *Myiagra Tytleri*, Beavan; *Alcedo asiatica*, Swains.; *Todiramphus collaris*, Scop.; *Picus andamanensis*, Blyth; *Edolius malabaricus*, Scop.

After a most delightful sojourn of some hours on the summit of the hill, the lengthening shadows warned us to retrace our steps. But before we reached Ross Island the soft obscurity of evening was fast settling down over land and sea.

G. E. Bulger, F.L.S., &c.

* "Report on the Vegetation of the Andaman Islands," p. 37.

THE JUMPING MOUSE.

(*Jaculus Hudsonius*, Wag.)

There is no one feature of our smaller tracts of woodland that is, to us, at least, more attractive than the lively, timid, jumping mouse. If, happily, we chance to come upon him unawares, and can keep ourselves unseen, we never weary watching his varied, graceful movements, and always laugh when at last we have alarmed him at his hurried bounds, as, with a few kangaroo-like leaps, he hides amid the long grass, or seeks the safer precincts of his hidden nest.

We have an abundance of other mice, both in the forest and on the fields and meadows; some, beautiful and sprightly, as the white-footed mouse (*Hesperomys leucopus*, Wag.); others, dull, uninteresting creatures, as the meadow-mouse (*Arvicola riparia*, Ord.); but not even the vivacious Hesperomys can compare to the little leaping Jaculus.

Fig. 65. The Jumping Mouse (*Jaculus Hudsonius*).

While properly a "wood" mouse, this little animal does not confine himself to shady groves and tangled underbrush, but wanders about the open fields, and not unfrequently contents himself with the scanty shrubbery of our country zigzag fences, in some tangled angle of which he builds a soft nest of grass.

Summer gone, and the sharp frosty autumn nights have come, down a foot or more into the ground he burrows, and curled into a little ball, with head, feet, and tail all hidden, soundly to sleep he goes, happily oblivious to all earth's troubling cares, until the genial warmth of the cheery April days rouses him from his lethargic* slumber, and Jaculus "is himself again."

* Prof. Penney, in "American Naturalist," vol. vi. p. 332, says of this mouse, "a colder night than usual seems to

We have said this pretty creature is called the "jumping" mouse, and very correctly is he named, although we have never, as stated by Godman,* seen it elude our "most eager speed by clearing five or six feet of ground at every spring." Our efforts to measure their longest leaps were not altogether satisfactory, but doubt if they ever reached three feet. A half-tamed specimen, when chased about a room, would usually, in leaping, about clear a breadth of Brussels carpet, *i. e.* twenty-seven inches. Doubtless, in their native haunts they exceed this, but we have never seen a Jersey mouse double it, on any ground, cleared, grassy, or woodland.

It must not be thought that leaping is this animal's only mode of locomotion. It can as easily and as rapidly run as any of the mice. Indeed, it is only when frightened, whether pursued or not, that it leaps rather than runs away. Why should this mouse have this advantage over its cousins? It is very natural to ask this, especially when the "reason why" of every fact in zoology is being so carefully sought out. We have puzzled ourselves with this query for a long time, and close observation has suggested to us this mere ghost of a solution, viz., that whether in woodland or in meadows, we have found these mice almost invariably where the grass or underbrush was exceedingly dense, and usually long also; and where, therefore, the ability to leap above rather than to run through such tangled vegetation was an advantage in eluding the pursuit of enemies, especially such as could only run upon the ground; and again, it is only in escaping from danger that the ability to leap, such as possessed by this animal, is advantageous to it, so far as we can determine. Nothing but escaping from a pursuing foe, in the habits of the animal, suggest the desirability of great leaping powers, either in its nesting, food-gathering, or the character of the localities frequented by it.

Again, it is the most timid, certainly, of all the mice, and if now, or in times past, it has, or has had a swift-footed enemy, then the advantage of being able to elude pursuit by long leaps rather than by running would be of great service, and the better jumpers having thus the better chance of escaping, would unquestionably leave a more numerous progeny inheriting this advantage; so that in time natural selection would in this way gradually eliminate the slower-footed and less nimble individuals, and secure to the descendants of the more ancient form that increased length of the hinder limbs which is now the one marked peculiarity of the lively little Jaculus.

A word and we have done. It has not been our experience, in studying this mouse, to find that it was strictly nocturnal in its habits, as stated by Audubon.* That it is more lively and active then than during the day is certainly true; but it is not an unusual sight to see them in broad daylight, during summer, running to and fro with their cheek-pouches distended with food that they are busily hoarding away in their underground nests; and sometimes the females do not leave their little ones behind when sunning themselves, but move with apparent ease with one or more babies hanging to their teats; and it is well known that when frightened they will bound away with all their little ones, and give as long leaps as though not thus encumbered.

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furnish the occasion for it to go into a state of the most profound lethargy."

* "American Natural History," vol. i. p. 321.

* Audubon and Bachman, "Quad. of North America," vol. ii. p. 252, 8vo. ed.

THE GLOW-WORM'S LIGHT.

NOTWITHSTANDING its notoriety, there is still much doubt associated with the economy of this insect. Possessing such a peculiar, noticeable property, we are not surprised that it attracted the attention both of the Greeks and Romans. Aristotle ("Hist. Anim.," l. iv. c. 1) says the glow-worm is found both in a winged and apterous state. If, as some believe, the glow-worm of Aristotle and that of this country are identical, then he was referring to the sexes; but he tells us (l. v. c. 17), the wingless kinds proceed from a small, black, hairy grub, and are finally metamorphosed into winged creatures termed *bostrychi*. There is some confusion here: the name *Pygolampis* (*i. e.* "shining-tail") evidently points to the female, which in *L. noctiluca* is wingless, but which in *L. Italica* has wings. It is likely, then, that Aristotle confounded these two species.

Fig. 66. Male Glow-worm. Fig. 67. Female ditto.

The larva of our common glow-worm agrees with the philosopher's description in changing, soon after it has emerged from the egg, from a whitish to a sable hue.

Pliny is plainer. He dilates on the light which Aristotle does not even mention. He says the luminosity, or, as he terms it, the colour, emanates from the sides and posterior portion of the beetle (laterum et clunium colore). ("Hist. Nat.," l. xi. c. 34.)

He was, probably, speaking of *L. Italica.* The Roman naturalist, too, notices the appearance and sudden disappearance of the light when the beetle is on the wing (nunc pennarum hiatu refulgentes, nunc vero compressu obumbratæ): in wingless females, at least, this light is subservient to the will of the animal. In another portion of his work (l. xviii. c. 66), he tells us that harvest-time is always accompanied by the presence of these insects. Dr. Holland thus quaintly translates the passage: "Now the signe common to them both, testifying as well the ripenesse of the one as the seednes of the other, are the glo-birds, or glo-worms, *Cicindelæ,* shining in the evening over the corn-fields: for so the rustical paisants and country clownes call certain flies or wormes glowing and glittering star-like, and the Greekes name them *Lampyrides*: wherein we may see the wonderfull bountie and incredible goodnesse of Nature in teaching us by that sillie creature."

It is perhaps fair to mention that Pliny does *not* attempt to lower the insects in the estimation of his readers.

There have been many speculations concerning the nature of the light; some would call it an electrical, and some a chemical phenomenon. "It is probable," says Goldsmith, "that the little animal is supplied with some electrical powers, so that by rubbing the joints of its body against each other, it thus supplies a stream of light." ("Animated Nature," ed. 1782, viii. 141.)

Goldsmith, maybe, developed this hypothesis from the fact that when the yellow matter of the light-producing organs is rubbed between the fingers, luminous streaks become apparent. Humboldt thought that the luminosity in living animals depended on "nervous irritation," as it was excited by galvanism; for when he brought zinc and silver in contact with the ganglion of the fore-foot of an expiring *Elater noctilucus,* strong phosphorescence was emitted. ("Views of Nature," ed. Otté, p. 250.) Some physiologists do not appear to be at all clear even as regards the portion of the body whence the effulgence proceeds. For instance, Dr. Carpenter, in one of his Manuals ("Animal Physiology," § 399), declares the light issues from the *under* surface of the three last abdominal plates; whereas in his "Zoology" (§ 621) he states that it springs from the *upper* part of the same rings. Milne-Edwards is of the last opinion, whilst the Rev. J. G. Wood mentions both surfaces. In all specimens I have examined, the light appeared to be evolved from both, but that which is visible on the superior surface may be looked upon as a reflection or absorption of the light from below, where the organs are situated; this is clear from the fact that after death the lower part *only* remains of a dirty white colour.

Most writers agree that in the female of *L. noctiluca* it proceeds from the inferior superficies of the caudal, penultimate, and antepenultimate segments, although it does not shine equally from these.

In Kirby and Spence's "Introduction to Entomology" it is set forth that in the anal segment the light remained the longest, and was the first to reshine. Two minute specks of light are seen on this segment, and in the remaining two the organs have been succinctly described as "two large yellowish-white luminous plates."

Dr. Carpenter, again, declares that the male "is not luminous;" the French anatomists, Louis Figuier, W. S. Dallas, and others, have the same notion. The first says the male, "qui est pourvu d'élytres noirâtres et d'ailes, n'est pas phosphorique." ("Élémens de Zoologie," p. 469.) But this is not a fact: in the male the illumination is given out from the ultimate segment; the specks, however, are smaller, and the phosphorescence differs in being of a "greyish transparent hue."

Rye says it is "sometimes" luminous, and the Rev. S. Haughton informs us that it ceases "after pairing, whereas the females are most luminous while engaged in laying eggs." ("Three Kingdoms of Nature," p. 321.) The larvæ, pupæ, and eggs are also faintly lurid. With regard to the anatomical structure of the organs, Professor Rymer Jones's explanation is that these particular organs in most insects agree in consisting "of an investing membrane enclosing a parenchyma composed of tracheæ and nerves, surrounding groups of cells so densely filled with white, spherical, minute granules, having an oily aspect when viewed by transmitted light, that no other constituent can be seen in them." ("Animal Kingdom," third edition, p. 363.) Hence "Kölliter concludes that the "luminous organs are a nervous apparatus, whose nearest analogues are to be sought for in the electrical organs of certain fishes." Others describe the granular matter as being of a yellowish colour. Professor Marshall further informs us that the "sacs are closed by horny lids, having peculiar flat surfaces suited to the diffusion of the light." ("Outlines of Physiology," vol. ii. p. 525.)

Most savans agree in supposing it to have a chemical origin, being in fact an organic secretion, which probably enters into chemical combination with the oxygen of the atmosphere; the effects of which are a slow combustion. Dr. Packard quotes Siebold, who thinks that the remission of the phosphorescence in fire-flies can be explained by this theory, "and which coincides, not with the movements of the heart, but with those of inspiration and expiration." ("Guide to the Study of Insects," second edition, p. 424.) The substance, whatever it is, does not appear to contain phosphorus in any appreciable quantity, and the product of its combustion has been found to be carbonic anhydride.

A glow-worm has been found still to retain its luminosity when *in vacuo,* and whilst under water.

In damp situations the light is observed to be more vivid.

The fact that the light increases with individuals as we approach the equator, would lead us to expect a rise of temperature would intensify the luminosity of our species: indeed it does, but extremes of heat and cold extinguish it.

It shines more in tepid than in cold water; agitation of the fluid, electricity, and oxygen likewise increase the luminosity. Such non-supporters of combustion as hydrogen, sulphuretted hydrogen, nitrous, sulphurous, and muriatic acid gases, and carbonic anhydride extinguishe it.

In some cases it has actually been heard to detonate when placed under hydrogen.

From some of these facts Spallanzani concluded that it is a compound of hydrogen and carburetted hydrogen gas. It is right to mention that many of these results have been denied; one author affirming that when placed *in vacuo* the light disappears, although restoration takes place on renewed exposure to the air; and that carbonic anhydride, previous to total extinction, excites it; another, that electricity produces no effect on it.

If the matter were always extracted from the animal, the results would most likely agree; it is not just to experiment on the living beetle, for total extinction of the light may be the result of instinct rather than that of the chemicals employed.

Faraday took great interest in the glow-worm. When a youth he made some experiments upon some found at Geneva. The luminous matter cut out of one preserved its quality for three days. I should think decomposition had set in before this, although it has been stated that the light ceases as soon as that change takes place. If produced by respiration, why should one sex be almost devoid of it? How could it be suddenly extinguished? Why should not the light be of the same intensity at all hours of the night, and at all seasons of the year? And, surely, if it were a case of chemical combination more or less heat would be evolved, which does not appear to be the case. Leaving these questions unanswered, we will proceed to speculations on the *use* of the light.

Poets have theorized on this subject as well as naturalists. Vincent Bourne has written some verses on the glow-worm, in which he says:

> "Perhaps indulgent Nature meant,
> By such a lamp bestow'd,
> To bid the trav'ler, as he went,
> Be careful where he trod."

This beetle is several times mentioned by Shakespeare. Hamlet's ghost declares

> "The glow-worm shows the matin to be near,
> And 'gins to pale his uneffectual fire."

It would be interesting to know at what hour of the night it really does cease to shine.

Shakespeare allows it to shine for a longer period than does Gilbert White, who remarks that they appear "to put out their lamps between eleven and twelve." In the comedy of "A Midsummer Night's Dream," Titania, addressing the fairies, in allusion to the humble-bee, says:—

> "And for night-tapers, crop their waxen thighs,
> And light them at the fiery glow-worm's eyes."

The light, as we have shown, does not proceed from the eyes, which are comparatively small in the female, nor does the luminous portion possess more caloric than the rest of the body, but, as Wordsworth says, it is quite a "harmless ray."

Some have imagined that as the glow-worm does possess the power of extinguishing its flame, it is to protect itself from nocturnal animals. But Swainson has very properly objected that "the owls and the goat-suckers are the only nocturnal birds which feed after sunset; but the former live upon much larger insects . . . . while the latter always seek their game at a much higher elevation in the air than phosphorescent insects ever ascend to." ("Habits and Instincts of Animals," p. 366.)

In Dr. Paley's "Natural Theology" (c. xix.) we find the following: "Two points seem to be agreed upon by naturalists concerning it; first, that it is phosphoric; secondly, that its use is to attract the male insect."

These two very points naturalists are now most *un*settled about. Its composition and its use are not known. Gilbert White, in "Hero and Leander," was evidently of Dr. Paley's contemporaries' opinion. Louis Figuier and Professor Blanchard do not doubt in the least that this is the use of the light. There are certainly objections to it. It does not apply to many marine hermaphrodite animals. Why should they necessarily perpetuate the species by night? The insect has been seen abroad during the day. The male would not require a light, nor the pupæ, larvæ, and eggs. Other insects find each other perfectly well in the dark, and why should this species be bereft of the instinct?

On the other hand, the male beetles have been observed to fly to a lantern, and an entomological friend of mine has seen them flying around the modern lamp-post. That moths and other beetles frequently do the same thing is certainly a serious objection.

In the male, again, the eyes are constructed for forward and downward vision; the organs are large, as if to adapt them for the absorption of rays of light.

It cannot be meant to steer the animal through the dark, as the light is behind. If we wished to make use of a lantern by night, we should not hang it beneath our coat-tails! If it were a means of defence, it would possess electrical or poisonous properties: it does not appear to be gifted with either.

It cannot be given to our British species as a means of obtaining food by indirect means, as in the imago state the insect sustains itself by tender plants. Rye says the perfect insect devours mollusca.

It may have been given by Nature merely as an ornament, not influencing the economy of the insect, but "for the same reason," says the Rev. J. G. Wood, "that the butterfly's wing glows with many-coloured plumage, and the rose is dowered with softly-tinted petals and sweet perfume." ("Insects at Home," p. 135.)

I think this is the most philosophical way of looking at it. Why must everything that Nature grants have a use?

Knapp, in his "Journal of a Naturalist," states that glow-worms shine faintly after the 14th July. This is not always the case, as I have observed them shining quite brightly late in August; nor was it after a shower of rain, the previous days having been remarkably hot and dry. A lady tells me that at Hastings, the gardens of poor people, during the months of July and August, sometimes have many of these insects scattered about them. At night, the moving dots of light must have a very pretty effect. Some of our readers will probably think of the lines occurring in the "Merry Wives of Windsor:"

> "And twenty glow-worms shall our lanterns be,
> To guide our measure round about the tree."

Notting-hill. E. Halse.

MICROSCOPY.

Mounting in Glycerine Jelly.—Permit me to supplement the remarks of your correspondents on the method of mounting in this medium, which I have employed for some time for mosses. The great difficulty is in cementing the glass cover, as most of the cements used have a great tendency to "run in." The method I employ, and which I find to answer perfectly, is that given at page 45 of that excellent little work on "Microscopical Manipulation," by Mr. W. T. Suffolk. This consists in using what is known as *electrical cement*, and as there may be many of your readers who do not possess this useful work, I make free to append the method of making and using it as there given. "Melt together five parts of rosin, one part of bees-wax, one part red ochre, and two parts of Canada balsam; mix well, and pour into pill-boxes of convenient size. This cement is most conveniently used with a miniature soldering-bit." I use a piece of thick brass wire beaten out at one end to a flat surface, and then filed off to the requisite or most convenient width,—say, not more than one-eighth of an inch. This should be moderately heated in the flame of a spirit-lamp, a portion of the cement taken up by it, and laid along the edges of the covering glass till it is cemented all round. It may then be smoothed off by heating the "bit" to a greater temperature, and running it round the edges until a neat, smooth surface is obtained. As this cement, however, is very brittle after it has set, which it does as soon as cold, a rim of gold-size should be run round it, which will make it perfectly adhesive, and render it quite safe from cracking. Mr. Suffolk adds, at page 55, "This system of compound cementing answers perfectly; the electrical cement having in the first instance no tendency to run in, and the gold-size effectually keeping it from separating from the glass." As, however, it is rather unsightly on the glass slides, I always use the paper covers afterwards.—*Charles P. Hobkirk, Huddersfield.*

Sand-blast.—In the remarks on the cells formed by this process, it is stated that they were adapted for opaque objects or fluid mounting. The inventor has called my attention to the fact that they answer well for mounting with balsam, when a dry cell is necessary.—*F. K.*

Extracting Lingual Ribbons.—In reply to "C. P. A.," I wish to mention that I have obtained the palates of very small land mollusca, such as *Pupa marginata*, by crushing shell and all between two glass slides and examining the mass, extended by pressure, with the microscope. The palate will soon be detected by its reticulated appearance, and the portion containing it parted from the rest. Two or three trials will enable the lingual ribbon to be cleared from the surrounding tissues. A bristle is the safest tool to use.—*George Guyon.*

Remounting Injections.—Allow me to inform your correspondent, W. Statham, that the best way of remounting the injections he refers to in your number of last month, is to allow them to get thoroughly dry and mount in balsam, after saturating them in benzole. I have many beautiful injections which I remounted in this way about twenty years ago.—*Thomas Brittain.*

Cells for Microscopic Objects. — Many objects, when mounted in balsam, require some kind of cell to prevent undue pressure and the consequent result; viz. fracture. Paper and thin glass have been used for such purposes, but there has always been the difficulty of maintaining these in position when the slide is heated sufficiently to harden the balsam. In order to avoid this difficulty, I make the cells with a mixture of common whiting, mixed with gum-water to about the consistence of good cream: this will work freely with a camel-hair pencil; and cells from the thickness of writing-paper to stout card can be as readily and expeditiously made as with the ordinary asphalt varnish. This mixture is also very useful for "ringing" the edges of the covers, particularly when soft balsam has been used: it not only prevents the slipping of the cover, but also the penetration of the asphalt, or coloured varnish generally used for "ringing." The space between the edge of the cover and slide should be filled up with the mixture, and when dry, the asphalt or varnish can be put on without risk of running in.—*F. K.*

Remounting Objects.—Most of the old injected preparations were mounted in Goodby's fluid. My own injections have most of them been remounted, either in glycerine and water, or distilled water with a drop or two of carbolic acid added (about four drops of the strongest solution of the acid to 1 oz. of water).—*F.K.*

A Problem in Mounting.—In preparing objects for the microscope, I have occasionally met with the following difficulty. A specimen, such as a small insect or diatom, after having been duly permeated with turpentine or benzole, and all traces of air thus expelled, is mounted in the usual manner in Canada balsam, and apparently successfully; but when again examined, perhaps in an hour, perhaps in a day afterwards, one is astonished to find that an aggravating so-called air-bubble has made its appearance in the interior of the specimen. The mount, therefore, is worthless, for if heat is applied in the vain hope of expelling the bubble, the blemish is only augmented. I purposely use the expression *astonished*, for, after the air has once been driven out, and the object satisfactorily mounted in balsam, it is evidently impossible that air can re-enter it. Whence, then, comes the bubble? This is the problem, and here is my explanation. The turpentine, or benzole, has entered and filled the specimen through a very minute orifice or fissure, but when it is immersed in the balsam, a much denser medium, that cannot do so, whilst the thinner medium within the object, having a natural affinity with the balsam, flows out from the object to mix with it,—a process of exosmose without the corresponding endosmose. But if the whole of the turpentine leaves the object, a vacuum would be the result, which cannot for a moment be supposed; and so I fancy that a portion of it, in the form of vapour, is left behind, and that the obnoxious bubble is composed of vapour, and not of air. I may be wrong, but I fancy I am right in my solution of the difficulty; for, occasionally, having mounted an object, and placed it immediately under the microscope, I have suddenly seen a little black speck appear, which, as I have watched it, gradually assumed the form of a constantly-increasing bubble. In such a case as this, it is generally useless to dismount the object, and, after having again soaked it in turpentine, repeat the process, as the same disappointment will probably recur. But the remedy is easy, and this is the useful and practical part of my communication. Having dismounted the specimen, if a diatom, it is only necessary to place a fresh drop of turpentine or benzole on it, and, having thus again expelled the bubble, to add to this with the point of a pin the minutest portion of fluid balsam, which thus greatly diluted will enter the object, and remain in it when immersed in the denser mass. For larger objects, such as insects, which must be resoaked in a watch-glass of turpentine, or other kind of bath, a larger portion of balsam is requisite; the principle, however, is the same, that the soaking medium should be only just sufficiently densified to insure the result.—*Fred. H. Laing, Lower Redlands.*

ZOOLOGY.

The American Potato-bug.—Agriculturists will be relieved by the letter from the Privy Council respecting the potato-bug. The accounts which have reached us from the United States of the ravages of *Doryphora decemlineata* were alarming in the extreme. It seems to have been generated in Iowa in 1861. Where it once gets a footing it soon makes its mark; it speedily destroys the potato crop. It is believed to effect all its transformations in fifty days, so that a single pair would, if unmolested, produce sixty millions of progeny in a single season. Nobody, therefore, will be at all surprised to learn that the insect is travelling east very fast, and has already taken up its abode in Ohio and Canada. But the accounts of its marvellous fecundity do not make the little creature by any means a more welcome visitor to our shores, and a memorial has been sent to the Government praying for a prohibition of the importation of American potatoes. A reply to that memorial has just been received, which is very reassuring. If the information it contains may be depended upon, the farmers may sow their seed and rest in peace. The Privy Council for Trade states that American official reports establish the fact that the larvæ of this destructive parasite are not deposited *in* the tubers or conveyed by them, and that with the exercise of an ordinary amount of care, the importation of the American potato can be rendered as safe as the transmission of our own. It is to be hoped that this fact has been shown by observation to be undoubted. Otherwise, nothing but regret will be caused by the statement that "My lords consider there is no reason for interfering with the trade between the two countries."

Exceptional Reproduction of certain Tineidæ.—Dr. Duncan, in his "Transformations of Insects," remarks that "many naturalists have observed that the species of *Solenobia*, one of the Tineidæ, have a most exceptional power of reproduction.

The maiden females of the genus lay eggs which can be hatched so as to produce larvæ, and a naturalist may breed a species for years without seeing a male *Solenobia*. This extraordinary fact is not without parallel amongst the Lepidoptera. . . . and it is common among the bees and the aphides." Concerning this, Mr. W. V. Andrews, of New York, makes the following remarks in the *Canadian Entomologist* for January, 1874:—"To many persons there will be, I hope, nothing new in the above statement, but there are more to whom it will not only be new but also incredible. In this connection I wish to state an occurrence, which, although not quite conclusive in its character, may, if known, recall to others similar occurrences with the same species, and they may have met with more definite results. Two years ago, wishing to rear several broods of *Eacles imperialis*, I placed a female of that species in a favourable situation for attracting the male. I had forgotten whether the male usually remained in the company of the female for a long or a short time, and watched pretty closely till 1 o'clock a. m., for the purpose of ascertaining that fact. I was much chagrined to find that at none of my visits was there any male visible. I was up betwixt 3 and 4 o'clock, a.m.—still no male; and at broad daylight the result was the same. The female had, however, laid on the branches of the tree on which she was confined about thirty eggs; and although I considered them worthless, I put them into a small box without quite knowing why. I removed the female the next night to a still more promising spot, hoping that the eggs remaining in her might still be impregnated. No trace, however, of a male was visible, but, by the next morning, she had laid a quantity of eggs, which I secured as before. Every one of these eggs was fertile; but now comes the curious part of the matter. Every one of the larvæ was of the dark brown variety—not a green one amongst them. Now what I would like to learn is this: Does any one know of any case in which *imperialis* has produced fertile eggs without male assistance, and, if so, what colour were the larvæ?"

Doryphora decemlineata (not *decempunctata*, as in the January number, 1874, of Science-Gossip), or "Ten-lined Spearman," *alias* "Colorado Potato-beetle," has reached the county of Lancaster, within sixty-five miles of the eastern limit of the state of Pennsylvania, and has become domiciliated, on both sides, along the Pennsylvania Central Railroad. It has been brought here in advance of its normal progress, which is about forty miles a year, doubtless by transportation on the railroad. In the autumn of 1871, the railways in the vicinity of Denison, Ohio, were so numerously infested, that their crushed bodies on the iron rails were a partial hindrance to the progress of the cars. The last brood of the *imago*, like Chrisomelans in general, pass their hybernation, sometimes, in places convenient for that purpose above ground. Therefore, after they left the fields in proximity to the railroad, when their natural food was exhausted, and cold weather was approaching, some of them may have crept into the corners and crevices of the "rolling stock" standing on the road; and thus, in the spring, were doubtless transported to remote localities along the road, in advance of their natural mode of travel. In the summer of 1872 they occurred in only a single locality in this county, but in 1873 they had spread to more than half a dozen, at least ten miles apart. Handpicking and *Paris green* are the only effective remedies so far known. —*S. S. R., Lancaster, Pa.*

Menopoma Alleghaniensis.—The presence of this animal in a tributary of the Delaware, according to an illustrated paper in the December No., 1873, of Science-Gossip, is news to me, and the manner of its getting there does not seem clear to my mind, although I have nothing to suggest more satisfactory. It is becoming "unpleasantly" numerous in the waters of the Susquehanna, where it is most commonly known by the name of "Hell-bender;" but it has several aliases, as "Mountain Alligator," "Mud Puppy," in addition to those mentioned in the paper of Dr. Abbott. Fifty years ago, this *Batrachian* was almost entirely unknown to the waters of the Susquehanna or its tributaries, but was common in the Ohio, Kentucky, Alleghany, Kanawa, and other streams west of the Alleghany Mountains. About forty years ago it was taken in the Sinnemahoning, east of the Alleghanies, and from that period to the present it has become more numerous, and has been taken, in various ways, at points lower down the streams, until, in the summer of 1873, several specimens were captured near "York Furnace Bridge," Lancaster county, Pa., which is only about twenty-five miles from Chesapeake Bay. Several specimens are in the museum of the Linnæan Society in this city, the largest of which is two feet in length. Its reputation for voracity makes it an unwelcome guest at this time, in the midst of stocking the Susquehanna and its tributaries with Black-bass and trout.—*S. S. R., Lancaster City, Pa.*

Microscopic Examination of Air.—We have received a copy of this extraordinary work, recently published in Calcutta by Dr. Douglas Cunningham. It is illustrated by numerous plates, detailing the organic forms he has detected in his microscopical examinations of air, by means of an instrument he calls the aëroscope. Among other conclusions the author arrives at, is, that distinct infusorial animalcules, their germs or ova, are almost entirely absent from atmospheric dust. *Bacteria* are likewise rare, whilst spores and vegetable cells are shown to be constantly present in the atmosphere. The majority of them are living, and capable of growth and development. No connection can be traced between the number of spores present in the air and the occurrence of diarrhœa, dysentery, cholera, ague, &c. It will be seen, from the scope of the book, that its contents are of a most important character, as bearing on the vexed question of spontaneous generation.

BOTANY.

Seaside Shrubs.—As considerable interest is now being taken on this subject, it may be as well to draw attention to two shrubs coming under the above denomination; viz., the *Atriplex halimus* and *Atriplex portulacoides*. The former is a tall evergreen shrub, growing on sandy shores in the south of France, five or more feet high. Loudon, in the "Encyclopædia of Plants," says: "In this country [England] its silver-coloured foliage adds to the variety of our shrubberies." At Marseilles, in the public promenade above the town, an elevated exposed spot, it forms very thick hedge-fences, as also at one of the railway-stations, some miles inland, on the Paris line. Some years back I saw a plant of it in Mr. Spary's nursery at Brighton, which I rather think came from a nursery at Ventnor, in the Isle of Wight. There is every reason to suppose it would bear the cutting winds on the Brighton seashores. The *Atriplex portulacoides*, or Sea Purslane, is a dwarf shrubby British plant, growing on muddy, clayey, or poor gravelly seashores in England and Ireland, two or more feet high, with small yellowish flowers. No doubt there are other shrubs peculiarly adapted to our seacoasts, which it is hoped those who have tested their fitness will bring to notice. Referring to the *Hippophae rhamnoides*, mentioned in a former number of Science-Gossip, it may be as well to state that an easy way to secure the two sexes, in order to obtain the beautiful berries, which are very abundant in bunches like the holly, is by layers or cuttings of the roots of shrubs of both sexes. They will grow in common soil. Mr. Balchin has one in his nursery at Hove, but which produces no berries, for the want of the two sexes. —*T. B. W., Brighton.*

Sudden Appearances of Plants.—Macaulay, speaking of the battle of Landen, says: "The next summer the soil, fertilized by twenty thousand corpses, broke forth into millions of poppies. The traveller who, on the road from Saint Tron to Tirlemont, saw that vast sheet of rich scarlet spreading from Landen to Neerwinden, could hardly help fancying that the figurative prediction of the Hebrew prophet was literally accomplished, that the earth was disclosing her blood, and refusing to cover her slain." (Hist. Eng., vol. iv. chap. i.) Is there any other instance of this on record, and is anything known of the species? These occurrences, like the appearing of *Sisymbrium Iris* on the ruins of burnt London, are very curious.—*John E. Robson.*

The London Catalogue of Plants.—On looking over the sixth edition of the "London Catalogue," and noting the census-figures which follow the names of the species, I remarked some records which seemed unaccountable. *Hypericum humifusum* is credited only with being at home in eight counties. Is this a printer's error? I have long considered this as one of our commonest plants. In Ireland it is so; it occurs with us from north to south, and most likely in all, or nearly all, our thirty-two counties. Again, surely *Littorella lacustris* is not so rare that it can be found in only nine counties. In this island it is reported from most of our districts, and I am sure it occurs in twice nine Irish counties. And again, why is it that a query follows the name of *Cicuta virosa?* a well-known and easily distinguished plant, and one of the most unlikely to be introduced artificially. Perhaps some correspondent may be able to throw more light on these points. The prevalence of plants such as the above should not, at the present day, be at all obscure.—*S. A. Stewart, Belfast.*

Water in Plants.—At a recent meeting of the Royal Irish Academy, Prof. M'Nab read a report on some researches into the physiology of plants. These experiments were, first, a series to determine the amount of water transpired by leaves; and, secondly, the ascent of water in the stem. The plants selected for both series of experiments were the cherry-laurel, the common privet, and the common elm. It would be impossible to condense the large series of experiments made by the author. One series, to determine the amount of water transpired by leaves, made on August 7, 1873, showed that, with very nearly the same exposure, and under the same conditions, the cherry-laurel lost, of water, 51·81 per cent. of the weight of the branch employed; the privet, 26·78; the elm, 65·61. Very many experiments were made to determine the actual rate at which fluid ascends in the stem. In Sach's experiment on this subject he fixed the rate to be 9 in. per hour. In Dr. M'Nab's first experiments he obtained a rate of 24 in. per hour. The present series of experiments were made on the same species of plants mentioned above. In the privet the rate was 6 in. per hour; in the elm the rate was 15·6 in. per hour. But in both plants the leaves and stem soon became flaccid, and the experiments were not completely satisfactory. In the cherry-laurel the rate in one experiment was 24 in. per hour; in a second, 13·2 in. per hour; and in a third, 18·6 in. per hour. The author also recorded a large series of experiments: 1. As to the rapidity of the ascent of fluid in stems when in (*a*) sun, (*b*) diffused daylight, and (*c*) darkness. 2. Rapidity of ascent in branches cut off in the dark. 3. Rapidity of ascent in branches with the cortical tissue removed. 4. Rapidity of ascent in stems deprived of their leaves. 5. Rapidity of absorption of lithium when applied at apex of the branch; and 6. Rapidity of ascent when fluid was taken up under pressure of mercury, intended to represent the root-pressure of the plant.—This report was also referred to Council for publication.

A Large Sundew.—Mrs. Mary Treat gives, in the *American Naturalist* for December, 1873, a remarkable contribution to our knowledge of the sensitiveness of the leaves of the Sundew, her experiments being chiefly made on the large American species *Drosera filiformis*, the leaves of which capture and kill moths and butterflies two inches across. Her observations are in accordance with those already recorded on English species, that the motion of the glands is excited only by organic substances, or if for a very short time by mineral substances, that the excitement passes off almost immediately. The most astonishing of her observations is, however, that when living flies are pinned at a distance of half an inch from the apex of the leaf, the leaf actually bends towards the insect until the glands reach it and suck its juices.

Snowdrop (*Galanthus nivalis*).—I have just seen one of the most magnificent exhibitions of this lovely plant it has ever been my lot to meet with. The pretty village of Over Compton, on the borders of Dorsetshire, has long been celebrated as the habitat of the Snowdrop, as it occurs there in several localities. The first in which I observed it was in a bosky little dell overshadowed by trees and not in its usual orchard station; but the grand show I would now describe is in an orchard, and the greater part of its surface, but more especially under the hedges, was carpeted with the fresh green leaves, ornamented with the pure white bells of the Snowdrop, and in greater profusion than I have ever before met with, even were all its stations added together. If this plant be really a native, I take it that Compton is just the place it might have been established in, as its sloping banks and well-wooded dingles would be just such as might be supposed to favour the growth of this early spring favourite. I have seen it somewhere stated that the double garden snowdrop on being left wild in the fields for a few years becomes single-flowered, and, on the contrary, if wild examples are transferred to the garden, they in a little time become double; but this is contrary to our experience, as we have known double examples in the field and single ones in the garden maintain their characters for as many as forty years.—*B.*, *Bradford Abbas, Feb.* 24.

Veronica Buxbaumii (*Buxbaum's Speedwell*).—Our arable fields, thanks to the bright sunshine of the last few days, are now quite gay with this agrarian weed. Perhaps no interloper has spread so rapidly in a short time as this; it is now, indeed, more constant in the field than was formerly the *V. agrestis*, which it seems to be entirely supplanting. Still, the latter holds its position in the garden, where the former is seldom met with.—*B.*, *Bradford Abbas.*

Buds on Roots.—If W. G. Piper will procure a young specimen of *Saxifraga granulata*, and carefully examine the bulbs, he will, I think, notice that they are collections of thick succulent pink scales, or appressed leaves, more or less navicular in shape, arranged around a common centre, and bearing buds in the axils. I do not know how Bentley defines a bulb, but, according to Balfour (Class Book, pp. 68—70), it is "a short subterranean axis, covered with fleshy scales containing succulent cells;" and further, "these scales are equivalent to leaves, and produce buds at the part where they join the axis." If we consider all the requisites for a bulb to be here laid down, it would appear that the swellings of *S. granulata* are really bulbs, of which the scales are not very closely applied. Assuredly, we are quite as correct in calling these bulbs as we are in terming the swelling at the base of *Ranunculus bulbosus* a corm (Lindley), or "kind of bulb" (Bentham). Upon referring to John's "Flowers of the Fields," I notice he gets out of the difficulty by describing them as "downy bulb-like tubers," though I cannot understand how the term tuber is here applicable. I should very much like to hear the opinions of other botanists upon this subject, and especially to learn if bulbs are really confined to Monocotyledons.—*H. Marshall Ward.*

GEOLOGY.

The Origin of the Lake Basins of Cumberland.—J. Clifton Ward, F.G.S., has read a paper on the above subject at the Geological Society. After referring to the fact that the question of the origin of lake-basins cannot be satisfactorily discussed unless the depth of the lakes and the heights of the mountains are brought before the mind's eye in their natural proportions, the author sketched out the physical geography of Derwentwater, Bassenthwaite, Buttermere, Crummock, and Loweswater, and pointed out what must have been their original size and shape before they were filled up to the extent they now are. These lakes were not moraine-dammed, but true rock basins. The belief that the present Lake district scenery was the result of the sculpturing of atmospheric powers, such as we see now in operation, varied by climatal changes and changes in the height of the district above the sea, was enforced, and the opinion given that the work of elaboration of the Lake-country scenery has been going on ever since Carboniferous or pre-Carboniferous times. The lake-hollows represented almost the last rock-shavings removed by Nature's tools. What were the special tools producing these hollows? There being no evidence of their production by marine action or by running water, since they do not lie in synclinal troughs, nor along the lines of fissuring and faulting, and cannot be supposed to be special areas of depression, it remained to see how far Professor Ramsay's theory accounted for their origin. The course of the old Borrowdale glacier was then fully traced out, and the power the numerous tributary glaciers had of helping to urge on the ice over the long extent of flat ground from Seathwaite to the lower end of Bassenthwaite Lake, commented upon. The same was done with regard to the Buttermere and Ireton Glacier, and the depths of the lakes, width and form of the valleys, and thickness of the ice shown by numerous transverse and longitudinal sections drawn to scale. When all the evidence was considered—the fact of the lake-hollows under examination being but long shallow troughs, the thickness of the ice which moved along the valleys in which the lakes now lie, the agreement of the deepest parts of the lakes with the points at which, from the confluence of several ice-streams, and the narrowing of the valley, the onward pressure of the ice must have been greatest,—the conclusion was arrived at that Prof. Ramsay's theory was fully supported by these cases, and that the immediate cause of the present lake-basins was the onward movement of the old glaciers, ploughing up their beds to this slight depth. It was pointed out that since the general form of the Buttermere and Crummock valley was that of a round-bottomed basin, as seen in transverse section, the effect of the ice was merely a slight deepening of the basin or the formation of a smaller basin of similar form at the bottom of the larger; whereas in the case of the Derwentwater and Bassenthwaite valley, which in transverse section was a wide flat-bottomed pan, the action was to form long shallow grooves at the bottom of the pan. This consideration was thought to explain the fact of the greater depth of Buttermere and Crummock than of Derwentwater and Bassenthwaite, although the size and thickness of the old glacier in the former case was probably less than in the latter.

Geological Notes on a Journey from Algiers to the Sahara.—George Maw, Esq., F.L.S., F.G.S., has just read a paper before the Geological Society of London, on the above subject. The author commences by describing the details observed on his journey from Algiers to L'Aghouat, on the borders of the Sahara. The distance traversed was 285 miles, or about 210 miles in a straight line, and in a direction nearly north and south. No eruptive rocks were observed. The oldest rock is a boss of mica-schist and gneiss behind the city of Algiers; it forms a low anticlinal, with the N. and S. strike. The pass through the gorge of the Chiffa in the Lesser Atlas shows hard slaty rocks dipping S. at a high angle; they are repeated as an anticlinal, on the south side of the higher part of the Tell plateau, and are probably Mesozoic. In the plain separating the Tell from the Hauts Plateaux, and on the south side of the latter, red and yellow sandstones form anticlinals; these rocks resemble the Bunter in mineral characters, and are overlain by red marls resembling the Keuper. In the northern escarpment of the Hauts Plateaux saliferous marls are exposed, interstratified between the sandstones and below the red and grey marls. Crystals of salt and gypsum are intimately mixed with the grey marls, and the so-called "Rochers de Sel" are capped with great blocks of rock tumbled about in confusion, the position of which the author ascribes to the failure of support due to the solution of the salt in the underlying salt marls. A thin series of bright red and green marls is seen to overlie the Red Sandstones in several places; and above this is an immense series of dark grey marls, interstratified with argillaceo-calcareous bands, forming a great synclinal of the Hauts Plateaux, and a contorted mass on the Tell plateau. These are probably cretaceous. At L'Aghouat they are overlain by fossiliferous beds, probably of Miocene age. Other tertiary beds observed are soft yellow calcareous freestones on the flanks of the promontory of Algiers and of the Lesser Atlas, and some red and grey marls and ferruginous freestone capping the Tell plateau, the former at a height of 100—900 feet, and the latter of 2,500—4,000 feet above the sea-level. The plain of the Mitidja, between the Lesser Atlas and Algiers, consists of grey loam with shingle-beds of post-tertiary age. A similar loam covers the great plain of the northern Sahara, and rises to a height of 2,700 feet. Raised beaches occur on the coast up to an elevation of 600 feet above the sea-level; and similar beaches are found inland, south of the Tell plateau, at a height of 2,000 feet. The oldest land in the line of section is the anticlinal of mica-schist near Algiers, the strike of which is nearly at right angles to that of the other rocks. The upheaval of the Mesozoic rocks was contemporaneous with the first upheaval of the Lesser Atlas; it was followed by a long period of denudation, and this by a subsidence of at least 3,000 feet in Tertiary times, during which the Miocene deposits were formed. The Tell plateau was thus elevated at least 4,000 feet, and the district north of the Lesser Atlas at least 1,000 feet, the north face of those mountains probably marking a post-tertiary line of fault of 3,000 feet. This operation was followed by a long period of denudation, and this by a post-tertiary depression, which the author terms the "Sahara submergence," after which the land was re-elevated at least 3,000 feet, but perhaps considerably more. A gradual subsidence appears to be still taking place.

NOTES AND QUERIES.

How to Prevent Mould.—Will any reader of Science-Gossip inform "F. J. S." how to prevent mould in fern-cases?

To Polish Shells.—Having noticed in your magazine for February the question asked "How to polish shells," page 39, I send the following receipt which I have seen used, and know answers well.—When you have collected your shells, wash them in clean water, and then prepare two-thirds water and one-third muriatic acid. Having first placed your shells in a glass or basin, then pour the water upon the shells, afterwards the muriatic acid; let them remain in this a few minutes, then take them out aud wash them again in clean water, rub each shell dry with a piece of flannel (fine, of course), finish them over with gum-water, using a camel-hair pencil for the purpose.—*Elizabeth Edwards.*

Ladybird.—The etymology of "lady-bird," a name given to various species of *Coccinella*, although pre-eminently to *C. septempunctata*, can be easily traced. That it was dedicated to the Virgin Mary, Our Lady, is evident from a glance at the word *Marien-käfer*, the German name for the insect. The same beetles are popularly known as lady-cows, -flies, or -bugs. Some view the affix *bird* as a corruption of *bug*, but they seem to overlook the fact that our glow-worm was once known as the *glow-bird*, and surely that beetle was never known as the *glow-bug*. Mr. E. Adams, quoted by Wedgwood, starts a different conjecture: the name "was probably given as seeming more appropriate to a flying creature (than that of lady-cow); but *bird* may here be a corruption of *bode* or *bud*, a name given to iusects of different kinds, as *sharn-bode*, dung-beetle, *wool-bode*, hairy caterpillar." He further says, "The beetle, whose spotted back might scarlet-red surpass," was not termed a bug on account of its colour, but obviously from its disagreeable odour. But what could be more offensive to eye and ear than thus placing the Virgin Mary side by side with the horror of many a honest household. The name *cow* is not readily traced; we are forced to reason from analogy. If *Ocypus oleus* is called a *coach-horse* in England, and an *ox* in Iceland, and if *Geotrupes stercorarius* is known in Poland as a "little cow," why should not a lady-bird be a cow too? I suppose to an entomological ear the affix "fly" is positively excruciating, but here we must deal tenderly with our forefathers, and remember that when they named the creature biology was in its infancy, and every insect that possessed organs of flight and was not identical with the beetle or the butterfly, was as a variety of fly. The lady-bird is the "Lady of Flanders," and has other aliases too "numerous to mention."—*E. Halse.*

How to Cut Slices of Coal.—Can any reader inform me how to cut thin sections of coal? In most works on the preparation of microscopic objects, the authors say the coal is macerated for about a week in a solution of carbonate of potash, at the end of which it is possible to cut tolerably thin slices with a razor. I have numerous pieces in solutions as above, and I find after being in even for months they are as hard as when first put in. Is it requisite to have any special kind of coal?—if so, what kind? I shall be glad of any information upon the subject. —*J. G., Croydon.*

The Origin of Window Gardening.—I shall be extremely obliged if any of your readers can inform me anything as to the origin and early history of this now popular, and I might add fashionable, branch of floriculture, together with the names of the earliest plants and flowers used for this purpose.—*B.*

The Mysterious Mousetrap.—I see in last month's Science-Gossip that Joseph J. Warry wonders what removed the mousetrap and ate the mouse. Very likely it would be its brethren. A few weeks ago I bought a penny mousetrap and set it at night. In the morning I was surprised to find a mouse partly pulled through the wires, with its head eaten off. The trap had been removed a short distance from the place I set it, through the other mice trying to pull it through the wires, I suppose. Most probably Joseph J. Warry's mouse ate all the bait in the trap before it fell a victim to its brethren. —*Jno. Staincliffe.*

Marine Aquarium.—I think "J. G." can obtain sea-water from any dealer in aquarium requisites for about sixpence a gallon. Mr. King, of Great Portland-street, used to supply it, and I suppose does so still, as well as seaweed, &c. I kept a small aquarium for a long time near London some years ago, but I obtained the sea-water during trips to the seaside, using well-washed wine-bottles for its conveyance.—*George Guyon, Ventnor, Isle of Wight.*

Query about Microscopes.—Would any one kindly oblige an inquirer with some information as to the relative merits or advantages of the various stages pertaining to Microscopes; viz., the plain sliding stage, the circular and rotating stage, the mechanical stage? Also as to "draw-tube," &c. I have a small French instrument (triplet), reputed to be 200 diameters, and am desirous of replacing it by something more serviceable and satisfactory (with coarse and fine adjustment, &c.); and as the instruments of different opticians are so various in manufacture and price, all the informatiou I can gather seems to tend to confusion, and I meet with no friends and acquaintances who have any knowledge of microscopes whatever. Is it absolutely necessary to obtain the basis of a good instrument only by the expense of the mechanical stage, and other complicated apparatus? As to objectives, the author of "Half Hours" recommends in a general way the 1-inch and 1¼-inch. Would that apply to the second or third rate quality, or to the higher and more expensive glasses?—*Enquirer.*

Reptiles and their Young.—I was very much interested with Mr. Forskey's account of the alligator taking her young ones in her mouth and conveying them to a place of safety. Had we more of these observers of nature, I think we might get the question solved about our own reptile, the viper, as to whether it does the same thing. I can easily understand a five-feet alligator opening her capacious jaws and the young taking refuge there; but there is no comparison between a reptile of this size and a small thing like the English viper, of 20 inches in length; for a reptile of this length to receive say six or nine young ones into its body, seems a stretch of the imagination when we consider that the young ones are generally about six inches long when born—nearly one-third the length of the parent. I hope that the ensuing summer will settle this question. If any observer should have the good fortune to see the swallowing operation, secure the reptile, and put it in a place of safety, and if the young should ever emerge into the light of day, we should then be satisfied as to the swallowing theory; till then I should say, well, it is not proven.—*James Kirby.*

Zoological Study.—Will you kindly insert the following?—A society is at present being formed for the promotion of general Zoology, by means of collection of types, a library, and general investigations. The hearty co-operation of zoologists in the furtherance of the object is earnestly desired. A committee of management has been already formed. Further particulars may be obtained upon application to the Secretary, *A. J. R. Tunbridge*, 2, *Ashurst-street, Battersea.*

Marine Aquarium.—In reply to "J. G." I think the best thing he can do to obtain his supply of "salt-water" is to manufacture it himself, unless he can purchase any of Mr. Lloyd, of 20, Portland-street, Regent's Park, who used to sell it. If "J. G." is unable to obtain any, he had better make use of the following receipt.—Table-salt 3½ ounces, Epsom-salt ¼ ounce, chloride of potassium 40 grains troy, chloride of magnesium 200 grains troy, to every gallon of water. With regard to the maintenance of the aquarium, if "J. G." will communicate with me, I shall be glad to give him every information.—*J. T. T. Reed, Ryhope, Sunderland.*

An Ornithological Opera.—The *Manchester Evening News*, of February 17th, had the following paragraph copied from the *Swiss Times*:—"An extraordinary public entertainment has been produced in Lima, Peru, by an Italian named Contarini, who proposes to bring his exhibition to Europe. He has taught and trained, by dint of great patience and perseverance, an opera company, made up of thirty parrots and paroquets, who perform two of Bellini's operas, "Norma" and "Sonnambula," on a miniature stage, with full chorus and recitative. The director and manager accompanies the artists on a piano harmonium, and the perfection with which each bird sings his part, and the excellence of the chorus, are prodigious. The *début* of his lyrico-ornithological company in "Norma" was attended by the wealth and fashion of Lima. When the paroquet that sang the contralto had finished the allegro to the "Salutation to the Moon," such was the enthusiasm, the shouting, and the applause at hearing a bird sing the "Casta Diva," that the bird company, affrighted, took flight, and sought refuge among the side scenes. This interrupted the performance for fully a quarter of an hour, and Signor Contarini had to tranquillize the "artists" by giving them bread soaked in wine, and henceforth the expressions of approbation were moderated, in order not to spoil the play. It appears that the bird artists have now become accustomed to the applause. The correctness and propriety with which they give certain parts of the opera are wonderful. The primo tenore possesses all the airs and graces of the school of Mario, and the ladies of Lima have named the prima donna, Patti." One does occasionally see some remarkable performances of animals, from fleas to elephants, but they pale into insignificance beside the above account, which must surely be either a hoax or a skit upon some human operatic company.—*Robert Holland.*

Electricity.—A friend of mine has a pony whose skin, when rubbed, emits electric light. When the finger-ends are rubbed smartly along the animal's back till they become hot, a stream of light accompanies them. I should mention that the pony is closely clipped. Darkness is of course necessary for the experiment. Has such a circumstance been commonly noticed?—*George Roberts.*

The Oldest Trees in Britain (p. 265, last vol.).—The Yew-tree mentioned by Evelyn as growing in the churchyard at Brabourne, Kent, has long since ceased to exist. The Cowthorpe Oak near Wetherby, Yorkshire, appears to have undergone very little change during the last hundred years. I have a beautiful water-colour drawing done by a lady from her own sketch of the oak in the summer of 1872, and on comparing it with the engraving in the "Silva," edition A.D. 1776, there is very little perceptible difference. At present the lower boughs are propped up and the trunk is hollow: this may have been the case in 1776, although not shown in the engraving. Dr. Hunter, in describing this veteran, says: "When compared to this, all other trees are but *children* of the forest." Humboldt, Mrs. Somerville, and Professor Balfour (probably upon the computation of Decandolle), estimate the age of the Brabourne Yew-tree at 3,000 years, whilst the age of a yew-tree at Heddon, Bucks, has been computed at 3,200 years; and that of the Cowthorpe Oak at 1,600 years. It is a singular fact that many of the largest yew-trees were formerly, or are at present, growing in churchyards, as at Brabourne, Gresford, Crowhurst, Fountains Abbey, &c. &c. Did the early Christians select the proximity of such trees for their churches and burial-grounds? If the computation as to their great age can be depended upon, such would appear to have been the case; and I shall be glad if any of your correspondents will express an opinion upon this subject.—*Francis Brent.*

The Liver (p. 238, last vol.).—There seems to be no inherent improbability in the proposed identification of the Liver with the emblem of St. John. It is, however, an error to suppose, with your correspondent, that the eagle was ever imagined to have been the actual companion of the apostle, either during his "mission [exile] in ths isle of Patmos," or at any other period of his career. Indeed, the evangelistic symbols (*vid.* Ezekiel i. 5, seq.) were not always at first assigned in precisely the same manner by early writers; and the eagle was finally attributed to St. John, because, as St. Jerome tells us, "Joannes quasi aquila ad superna volat, et ad ipsum Patrem pervenit, dicens: In principio erat Verbum, et Verbum erat apud Deum, et Deus erat Verbum." But the subject is, perhaps, rather out of place in the pages of Science-Gossip.—*R. A. Pryor.*

Disappearance of Colias Edusa.—"J. R. S. C." observes in the March number of Science-Gossip, that he did not observe a specimen of *C. Edusa* during the autumn of 1873 near Gravesend. I was staying then in the Isle of Wight, where it is usually plentiful, but only saw two specimens, one of which I captured, though I spent several days in searching the clover-fields. This shows that the scarcity of *C. Edusa* last autumn was not confined to North Kent.—*C. G. Thomas.*

NOTICES TO CORRESPONDENTS.

W. Ranson.—Matlock is the best place in Derbyshire for obtaining minerals, but not half of those sold there as coming from the neighbourhood, are of local origin.

T. C.—We received your post-card inquiring as to the cost of the advertisement of the Butterfly *raffle*, but we must declinc its insertion, as raffles are illegal!

W. S. O.—The season for the study of micro-fungi is just coming on, the first plants producing them being the Lesser Celandine (*Ranunculus ficaria*). You cannot do better than at once to procure Cooke's "Microscopical Fungi," published by Hardwicke, 192, Piccadilly.

L.—We only admit "Exchanges" gratis in the column devoted to them. A collection for *sale* would be charged as an advertisement.

J. B. S.—Your specimen is *Hepaticu triloba*, a European, though not a British plant.

H. C. R.—The "Geological Magazine," edited by H. Woodward, F.R.S., is the only serial of the kind, published monthly at 1s. 6d., by Trübner & Co.

J. P. G.—Can you send us another specimen of the beetle? The last was lost in transit.

M. J. G.—The empty eggs on the specimen of Sertularia are those of a species of *Natica*. The *Ectocarpus* is encrusted with diatoms, and the specimen from a cave at Tenby, and near Beaumaris, is *Cellularia avicularia*.

E. M.—Waterhouse's Cabinet List of British Coleoptera may be obtained from the author, British Museum. There are also lists (not for labelling) by Crotch, Rye, & Sharp.—*G. C. B.*

T. J. Woodrow.—You had best apply to the Hon. Secretary of the Geologists' Association, University College, Gower-street, for information respecting their meetings and excursions. That will be the society best calculated to meet your wishes.

R. O. S.—Your specimens are:—1. *Diphasia pinaster*; 2. *Sertularia cupressina*; 3. *Corallina officinulis*. The latter is a sea-weed, not a zoophyte.

Preserving Animals, &c.—D. H. (Antrim) wishes to know the best way of obtaining the skeletons of animals otherwise than by placing the bodies near ants' nests. J. W. also asks for the title of some work giving instructions for collecting crustacca. Perhaps some of our readers will kindly answer their queries. The latter had best refer to Science-Gossip for Junc, 1872, article on "Collecting and Preserving" Lepidoptera, for entomological information. The vol. for 1872 further contains a lengthy article on "Collecting and Preserving" Coleoptera.

Miss H.—Some of your plants we can make out; others are too obscure and badly preserved. There are no numbers affixed to the specimens. The following are those named:—*Vinca minor*, *Diplotaxis muralis*, *Valerianellu olitoria*, *Festuca uniglumis*, *Lagurus overtus*, *Ornithogalum umbellatum*, *Sherardia arvensis*, in addition to common species of *Gulium*, *Lychnis*, &c. Get Mrs. Lankester's "Wild Flowers worth Notice," London: Hardwicke, 192, Piccadilly.

W. D. E.—The insects which committed such ravages on your currant bushes are *Nematus ventricosus* (Gooseberry Saw-flv) common on both gooseberry and currant trees.—*G. C. B.*

Errata.—In Mr. J. O. Harper's article on the *Hemiptera* last month, several important errors require correction. On page 53, for *Trissieræ* read *Trimeræ*, for "trestle," read "bristle," and "stout" for "stone."

E. Evans.—We are always happy to act as a mode of communication between subscribers. No charge is made for "Exchanges" if they do not exceed three lines in length.

EXCHANGES.

Well-mounted Slides of Stellate Scales from rare ferns; viz., *Nothochlæna lævis* and *Goniophlebium sepultum*; also same *in situ*, for really good Slides.—J. Carpenter, Turners Hill, Cheshunt.

Sections of Spinal Chord of Cat, Brain of Mouse mounted in balsam, for (mounted, named, and selected) Diatomaceæ.—G. G., 11, North-terrace, Alexander-squarc, London, S.W.

Eggs of Kestrel, Sparrow-hawk, Curlew, Golden Plover, Dipper, common Tern, and others, for equally good Eggs. Unaccepted offers not answered.—Jas. Ingleby, Eavestone, Ripon.

Good specimens of *Glyphomitrium Daviesii* and *Seligeria pusilla*, for other scarce British Mosses.—Saml. A. Stewart, North-street, Belfast.

British Land, Fresh-water, and Marine Shells, for Foreign Land or Fresh-water.—G. Sherriff Tye, 68, Villa-road, Handsworth, Staffordshire.

Slides of Arborescent Silver for Microscopic Slides.—F. G. Mellish, 32, Knowle-road, Brixton, London, S.W.

Imagos of *Cynthia* and *Cecropia* for Pupæ of *Machaon* and *Carpini*.—S. H. Gaskell, Edgeley, Stockport.

Spiracle from larva of *Geotrupes stercoraria* and a dozen named species of Spiculæ, including *Gorgonia*, *Alcyonium*, *Muricea*, &c., well-mounted.—Send list to J. Wilson, Owen's College, Manchester.

Skin of Thornback Skate (showing spines, &c.), with many other duplicates.—Send list to C. C. Underwood, 25, Gloucester-place, Portman-square, London, W.

For Slide of Cholestrine, send stamped box and well-mounted Slide of Urinary Deposits to Wm. Sargant, jun., Caverswall, Stoke-on-Trent.

Good dried and pressed Specimens of Sea-weeds wanted for ornamental purposes.—J. Song, Regent-road, Salford.

Lon. Cat., 3a, 31, 68, 122, 204, 259, 261, 287, 1325, 1338, 1371, &c., for 3b, 11 vars., 12, 13, 36, 47, 50 vars., 56, 59, 60, 61, 62, 228*, 237b, 147, 148, 161, 676, &c.—John E. Robson, Seaview, Hartlepool.

British Mosses wanted for Flowering Plants.—W. H. Pearson, Blue-Boar-court, Manchester.

Wanted, the *Monthly Microscopical Journal* (excepting vols. 1 and 2), for which 24 slides of choicely mounted Microscopic Objects will be given for each well-bound volume, or 18 slides for each 6 clean numbers.—Captain John Perry, 42, Spellow-lane, Liverpool.

Wanted, Science-Gossip (previous to 1870); 15 Microscopic Slides for good bound volumes, or 12 slides for each 12 numbers. Foreign gatherings of Diatomaceæ and Foraminifera will be given instead of slides if preferred.—Captain J. Perry, 42, Spellow-lane, Liverpool.

Sections of Kidney injected two colours; ditto from human fœtus, and other anatomical preparations, for other really good slides, not diatoms or fungi. Lists exchanged.—W. W. Jones, 14, Lancaster-street, Lancaster-gate, Hyde-park.

Transverse section of *Acer campestris*, and skeleton leaf of *Populus tremula*, well mounted, for other good slides. Entomological subjects preferred.—E. Lovett, Holly Mount, Croydon.

Shells wanted: *Helix revelata*, *H. fusca*, *Achatina acicula*, *L. glutinosus*, *L. involutus*. Offered: *Clausilia dubiu*, *H. sericea*, *Planorbis imbricutus*, *Planorbis lævis*, and others. Exchange of *Desiderata* invited.—W. F. Sutton, Gosforth-grove, near Newcastle-upon-Tyne.

L. dispar, *ulmata*, *brumata*, *hyperanthus*, &c., for other species of Lepidoptera. Please send list of Duplicates.—C. G. Thomas, The Grove, Highgate, N.

Wanted: *H. obvoluta*, *H. lamellata*, *H. concinna*, *H. fusca*. Offered: *H. pulchella*, *H. rupestris*, *Pupa secale*, *C. lubrica*, &c.—Miss F. M. Hele, Ellensleer, Redland-grove, Bristol.

BOOKS RECEIVED.

"A Sketch of the Geology of Suffolk." By J. E. Taylor, F.L.S., F.G.S., &c. Reprinted from White's Gazetteer of the County.

"On the Modified Turkish Vapour Bath." By J. L. Milton. London: Hardwicke.

"Smithsonian Report" for 1871.

"Mental Physiology." By Dr. Carpenter, F.R.S. London: H. King & Co.

"Journal of Applied Science." March.

"The Lens." December.

"On Instinct and Reason." By John Colquhoun.

"Grevillea." March.

"Monthly Microscopical Journal." March.

"Supplement to the Fauna and Flora of Eastbourne." By F. C. S. Roper.

"Silver & Co.'s Handbook for Australia and New Zealand."

"Bulletin of the U. S. Geological Survey of the Territories." No. 1.

Communications Received up to the 12th ult.—T. B. W.—A. T.—F. H. L—W. F. S—J. L—E. E.—J. E. R.—E. L.—C. M.—J. L. H.—H. C. C.—A. M.—F. W. B.—F. K.—G. H. K.—T. B. W.—Dr. C. C. A.—S. J. McI.—C. M.—T. W.—F. M. H.—F. W. H.—H. M. W.—C. G. T.—C. L.—W. H. W.—R. H. M.—T. S.—M. L.—R. B.—W. F. S.—J. H.—G. W. B.—W. C.—E. E. E.—C. C. U.—S. H. G.—W. S. jun.—E. L.—J. L. H.—W. F. D.—W. W. J.—W. H. P.—G. G.—J. W.—E. H.—S. A. S.—J. B.—J. G.—F. W. B.—Geo. G.—J. I.—J. C.—C. W.—H. E. W.—T. W.—R. T.—E. E.—J. F. R.—R. H.—S. S. R.—T. B.—G. S. T.—E. G. S.—C. C. U.—D. R.—H. A. M.—J. H. G.—M. A.—A. G. R. T.—J. K.—J. F. F. R.—S. H. G.—C. P. H.—W. H.—H. G.—O. A.—S. A. N.—W. E. T.—T. T.—R. G. S.—A. T.—M. O.—T. B.—L. D. C.—J. P.—S. C. S.—R. H.—&c.

ON THE MODE OF LOOKING AT PICTURES.

By Sir FREDERICK MONTAGU-POLLOCK, Bart.

If the old saying be true that "there is nothing new under the sun," I am probably mistaken in supposing that the fact, to which I am about to draw attention, has not been published before. I need only say that I have not met with any mention of it, and I think it worth noticing.

Most people understand the principle of the stereoscope. They know that when Nature is looked at with both eyes, each eye sees a somewhat different view,—though from the way in which these views are combined, the difference is not generally recognized,—and that, in order to give the true appearance of objects, receding and standing apart from each other (as viewed with both eyes), two different pictures must be taken, which must likewise be combined by means of lenses, as is done in the stereoscope; and when this is properly managed, the pictures no longer look like flat surfaces, but like the things themselves they are intended to represent, the objects all appearing to be in actual, *bonâ fide* relief.

That a great deal more is seen with two eyes than with one (when looking at things around) can easily be shown by simply holding up a finger at a span's length from the face, and at the same time looking at a small object behind it (such as a thimble) at a distance of a yard or two off. It will be found impossible to make the finger hide the thimble with both eyes open; but if one eye be shut, the finger can at once be made to conceal the thimble from the sight.

Again, although a single painting—such as that of a statue in a niche in the wall—may be so well executed that, at a considerable distance, it is almost impossible to decide whether it is a statue or only the representation of one; and people have been deceived by such mural paintings when looking, for instance, from the boxes of a theatre to the walls opposite, under the influence of artificial light; still, there are no means at present known, or likely to be known, by which a single drawing (of landscape-scenery, shipping, buildings, and so forth, whatever its truthfulness or excellence) can be made to represent at a distance, say of from two to five feet, what would be seen with both eyes when looking upon the shipping, buildings, &c., or what would be seen when two stereoscopic pictures are combined: though a single drawing can, and often does, represent very exactly the scene presented to *one* eye by Nature. And the conclusion to be drawn from this is that the proper mode of looking at a drawing or picture, is to do so with one eye only; for, if looked at with both eyes, you can immediately detect that it is a mere picture on a flat surface (because, as before stated, there must then be two pictures to make a perfect deception), whereas if only one eye is used, and the head is held perfectly still, then (as the mind is precisely under the same circumstances as it would be if the real objects themselves were being looked at with one eye, and having no means of detecting any difference between the representation and the real things represented) at a short distance a drawing, *after a few seconds, does almost seem to be stereoscopic*, or, no longer appears as a mere flat surface: and this is the point to which I wish to draw attention. The same reasoning will of course apply to photographs and good engravings, especially to those of buildings (such as the Forum at Rome), cloisters, and interiors, and views of bare trees.

Whether the foregoing explanation accounts for the phenomenon or not, I think there can be no doubt that the pleasure of quietly and thoughtfully studying good drawings will be very greatly enhanced by the method I am advocating, viz., that of looking at them with one eye only.

I may mention to those who wish to try the experiment for themselves with the best effect, that Mr. Newman, of Soho-square, has a simple, useful, "handy" little instrument for the purpose, which greatly facilitates the process.

Thurlow, Clapham, S.W.

ON PRESERVING AND MOUNTING FRESH-WATER ALGÆ.

Having had considerable experience in this matter, and having mounted many hundreds of slides which have retained much of their original beauty for many years, I may perhaps be able to give a useful hint or two to your correspondent interested in the subject. I have specimens mounted as early as 1851 which, though they have lost their green colour, still show the natural disposition of the endochrome, retain their external form unimpaired, and show no signs of intrusion of the varnish. The bulk of my slides are five or six years old, and the percentage of those which show any signs of "running in," or of evaporation of the liquid, is very trifling.

Such as are defective are nearly all my earlier attempts, and I firmly believe that slides mounted according to the plan I now adopt are practically permanent. Let us divide the subject into four heads; viz., forming the cells, fluid to be used, introduction of the plant, and sealing the cells. My plan is as follows:—

1st. *The Cell.*—For most Algæ, including the Desmidiaceæ, a ring of thin gold size, spun by means of a "turntable."

This should not be narrow—⅛ inch is not too much; it should be either left to harden for several months or baked for a few hours in a slow oven.

For thicker Algæ, as *Batrachosperms, Draparnaldiæ,* &c., I prefer block-tin rings, which should be cemented to the glass by marine glue.

2nd. *The Fluid.*—I have tried nostrums innumerable without finding any which preserves the colour of these plants, and have come to the conclusion that we must be content if we can keep the endochrome in its natural *form*, sacrificing its colour.

Now if the medium be denser than the water with which the plant is filled, the endochrome is forced into the middle of the cell in a shapeless mass. It is essential to avoid this condition; and after many experiments, I have adopted distilled water, slightly camphorated to prevent growth of fungi in the cell. If this medium be used, the endochrome usually retains its natural form and position.

3rd. *Introduction of the Object.*—Dr. Wood's mode of securing the plants is inapplicable to any species with which I am acquainted. My own experience is that the specimen should be raised from the water in which it grows with as little disturbance as possible, placed at once in a drop of the medium in the cell, and, if necessary, slightly arranged by means of two needles. (The Desmidiaceæ require special treatment to obtain them quite clean, which I shall be happy to describe in another paper if desired, but which I pass for the present.)

4th. *Sealing the Cell.*—The most important part of the business.

The great secret of securing permanency is this:—Immediately before placing the object in the cell, put the latter on the turntable, and moisten the ring with the least possible dressing of fresh gold-size; touch the edge of the glass cover for about one-sixteenth of an inch inwards with the same substance.

Then lower the cover on to the cell. If there be a superfluity of the liquid, the fresh gold-size resists its escape, and the cover floats, as it were, on the medium. A gentle pressure then forces out the surplus liquid, and the last portions may be drawn out by a fragment of blotting-paper. No air enters, yet the medium is sucked out by the paper until the pressure of the air holds the cover on so tightly that it can scarcely be pushed on one side. The two surfaces of gold-size amalgamate without a particle of water remaining between or, in other words, neither cover nor cell is ever wetted.

Finally, two or three successive coats of gold-size are run round the edge of the cover at intervals of a few days, and the whole is secure. For a finish, I use a coating of copal-varnish, in which vermilion has been rubbed up with a palette knife; others prefer a similar preparation of white lead. It is most important to keep the slides flat in the cabinet; I believe the most carefully prepared specimen will give way in time if kept vertically.

While writing on this subject, may I remark that it is a great pity that this most interesting but complicated tribe of plants does not find some bibliographer who has time and ability to collate and reconcile the almost innumerable descriptions of genera and species now scattered through the works and papers of Kützing, Braun, Thuret, Hassal, and a score of other observers at home and abroad, at present forming a heterogeneous mass of data, accessible to few, intelligible to fewer still, and requiring the patient labour of a master-hand during many years to reduce them to a harmonious scientific whole. A. W. Wills.

THE POTATO DISEASE.

WHAT with the difficulty still remaining as to the curability of the micro-fungi attack commonly called the Potato Disease, and the threatened invasion of the Colorado Beetle, our much-prized tuber seems to be in no small danger of extinction. Any information respecting the former is of value to the scientific agriculturist, and we are therefore pleased to see a well-known botanist, Mr. Worthington G. Smith, F.L.S., once more ventilating the question in the last number of the *Popular Science Review*, in an article headed "Side Lights on the Potato Disease," from which we have borrowed the illustrative woodcut. Mr. Smith thinks that an undue importance has been given to the non-discovery of *oospores* in the potato fungus (*Peronospora infestans*). Little is known, at present, of the winter life of this pest, and the writer thinks that the earth from which diseased

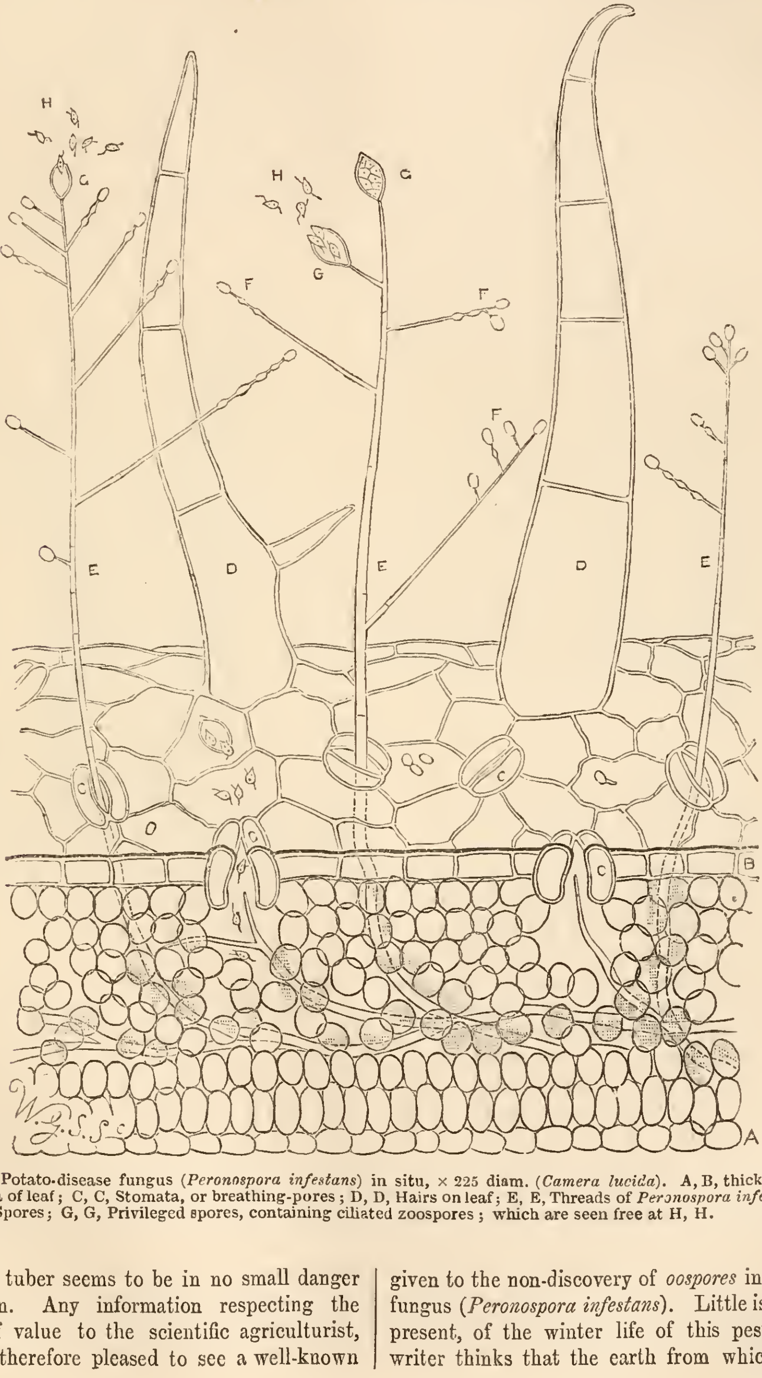


Fig. 68. Potato-disease fungus (*Peronospora infestans*) in situ, × 225 diam. (*Camera lucida*). A, B, thickness of lamina of leaf; C, C, Stomata, or breathing-pores; D, D, Hairs on leaf; E, E, Threads of *Peronospora infestans*; F, F, Spores; G, G, Privileged spores, containing ciliated zoospores; which are seen free at H, H.

potatoes have been taken should be carefully examined. It is not improbable that the winter life of the fungus may reside in extremely fine compacted threads under ground, and near the decaying tubers. Mr. Smith thinks De Bary's statement that there is nothing in one potato plant more than in another to predispose it to the attack of the disease, is "not proven." The forthcoming great trial of potatoes by the Royal Agricultural Society will probably set this important question at rest.

Mr. Worthington Smith has himself recently made some experiments on samples of different potatoes, in all stages of disease. These he recounts in the above article, and we would strongly recommend its perusal to all interested in the question. One of the varieties that appears to have best stood the experiments exposing it to the attacks of the disease, is that recently brought out under the name of the "Red-skin Flour-ball." "Paterson's Victoria" seems to have been another good sort, whilst "Flukes" suffered badly, as also did the kinds known as "Peach," "King of Earlies," "Early Rose," "Kentish Early," and others. The potato-skins resist decomposition to the last. The author (like Prof. Dyer, in an article in SCIENCE GOSSIP for 1872) is of opinion that the most reasonable suggestion for exterminating the potato disease is to cultivate those early varieties which mature their fruit before the fungus makes its attack, and so to *evade* the disease. And yet it was a positively *late* potato, and not an *early* one, which, according to Mr. Smith's experiments, best warded off the murrain. So surrounded with difficulty is this most important inquiry.

OLD YEW-TREES AND THEIR PRESUMED AGE.

IN remarking upon "Ancient Trees" in SCIENCE-GOSSIP (No. 111, page 56), E. Edwards has given some particulars as to remarkable yew-trees, which are very interesting, but the alleged age of some of the trees mentioned seems mere supposition, founded on no accurate or proximate principle. What data is there for saying positively that the Gresford Yew was planted in the year 426? If we compare its dimensions with the Fortingal Yew (56½ feet in girth, and in a ruined state), which is the only British yew that can be certainly referred to Roman times, it is scarcely conceivable that the Gresford Yew can be dated so far back. The yew represented in the wood-cut that illustrates the article referred to, is assuredly *not* the "Fortingal Yew," as stated, for it differs materially from the representation in Strutt's "Sylva," and copied on a smaller scale in Loudon's "Arboretum Britannicum." There are many yews in existence as large in dimensions as the Gresford (Denbighshire) Yew, and some of greater magnitude. If the Tisbury Yew, in Dorsetshire (the notice of which E. Edwards has taken from Lauder's edition of "Gilpin's Forest Scenery"), is "now standing," it must be the largest in England; and the Crowhurst Yew, on the borders of Kent and Surrey, is almost the only one still flourishing, which, though hollow, can compete with it for magnitude. Of this latter tree, it is stated in the *Illustrated News*, which a few years ago gave a view of it, that "the interior is hollow, and has been fitted up with a table in the centre, and benches around for as many as sixteen persons." One of the most massive and yet hollow yews that I know exists in Marden Churchyard, Herefordshire, having a seat around its interior where I have reclined, and ten or twelve persons might have joined me, sitting rather close. This yew measures 30 feet in girth. In Mamhilad Churchyard, Monmouthshire, there are thirteen fine yews, the largest of which measures 29 feet 4 inches in girth, and has within its hollow a separate bole, which has originated by a process of natural inarching, and, as Loudon intimates, may exist a thousand or more years hence, when the original tree of which it was a scion has yielded to decay or the tempest's rage.

Professor de Candolle, from an examination of various yews, young and old, arrived at the conclusion that in very old trees the average of their increase in size would be a line annually, so that the lines of their diameter would correspond with their age. On this principle, the Tisbury Yew would be more than 1,780 years old, and the Fortingal Yew, reckoning its girth at 57 feet, would have existed 2,736 years, and as Dr. Neill, who visited the tree in 1833, suggests, "was a flourishing tree at the commencement of the Christian era." Professor Henslow and other botanists have, however, thought that the measure of De Candolle made yews too old, and they would certainly increase in size more rapidly for the first three hundred years, as I have observed in some felled yews that came under my own notice; and probably an average increase of an eighth of an inch in old yews would be a nearer approximation to the truth. On this latter computation, the Gresford Yew would be about 900 years old, which is far more probable than its "supposed" planting in A.D. 426, founded on no reliable record. It is stated of the yew-trees now existing near the ruins of Fountains Abbey, Yorkshire, that the Cistercian monks, who came there in A.D. 1132, sheltered under these trees, which is 742 years ago; so that, as these yews must have been of considerable size for the monks to have found shelter under them, on the lowest computation, allowing the trees to have been only of the growth of 250 years in 1132, they would now be without any doubt nearly 1,000 years old.

But there are many instances in which scarcely an approximate idea can be arrived at in the case of very aged yews that have become *resuscitated*, and thus have a claim to be considered as the *emblem of immortality*, which seems a probable cause of their being planted in churchyards; for strange to say, terrible as were English archers with the "bended yew," they mostly used foreign wood for their bow-staves, as being better seasoned, and more fitted for military purposes, though English-grown yew did for the chase and home practice, every boy being taught to bend the bow, as Bishop Latimer tells us in his quaint sermons preached before King Edward VI. By the process of resuscitation that I am about to describe, a yew-tree may exist an indefinite time, and there is no limit to its existence if not blown down.

Fig. 69. Resuscitated Yew at Little Malvern.

When an aged yew gets into a state of decay, and is unable to keep up life by an exogenous growth of regular annual rings, layers of alburnum descend from above to the ground; new wood is formed, and the old bole is thus actually enveloped and preserved, while from this new wood branches and foliage arise, and the old tree assumes a juvenescent aspect, except where the old decaying bole is visible before it is quite entombed by its living offspring. I send a sketch of an old yew standing in the Priory churchyard at Little Malvern, in which this resuscitating process is well shown, the new wood (which is dark) having almost covered the original bole, while the old, dead, and broken branches stand out in a curious and remarkable manner. I have noticed a similar appearance in many other ancient churchyard yews, and some attempt at this renovation may be observed in almost every very old yew, although of no extraordinary size.

Although in the majority of cases where yews appear in churchyards, they were doubtless planted at or after the consecration of the sacred edifices, yet it may well be thought that occasionally the site for a church was chosen on account of the proximity of a fine yew at the spot. Especially might this be the case where several yews were located, as is actually recorded with regard to the Fountains Abbey yews in Yorkshire. Leland also mentions no less than thirty-nine yews as standing in his time (in the reign of Henry VIII.) in the cemetery of Strata Florida Abbey, in Cardiganshire, and probably there before the abbey was founded. Of these, however, only three now remain, and one of these when I saw it formed a vegetable ruin divided into two parts, denoting extreme old age. The Welsh seem to have been particularly devoted to the yew, for many of their churchyards are gloomy with numbers of them, for they were not merely contented with the single "sable yew" that characterizes an English country churchyard. The presence of the yew with its perpetual verdure and enduring vitality symbolized the everlasting life that was to succeed the mortality of the grave, and yew-branches were also used in processions of the Church and at funerals. This sufficiently accounts for the partiality of the Welsh to the yew (*yw*, ever-living), for they were never celebrated for the use of the bow in their intestine and predatory warfare.

EDWIN LEES, F.L.S.

THE HISTORY OF OUR COMMON CULTIVATED VEGETABLES.

By H. G. GLASSPOOLE.

No. I. THE POTATO (*continued*).

NO plant of any description has exercised so great an influence on the moral, physical, and political conditions of our country as the potato.

In 1811 and 1812, the high price of corn and all breadstuffs caused the cultivation of this root to be greatly extended; and indeed some of the political economists of those days went so far as to advise the Legislature to recommend that every farmer should grow one acre of potatoes for every hundred acres occupied; but although this was not carried out, the cultivation continued rapidly to increase in all parts of the United Kingdom. That extraordinary man Mr. Cobbett stigmatized the potato as "the accursed root," and foretold the dis appointment that would in course of time arise from its too extensive cultivation; and his predictions have been verified at least with respect to Ireland; for it is not too much to assert that much of the dreadful misery that has taken place in that country may be traced to a too implicit reliance on this root as an article of daily sustenance, without any admixture of other food.

In Morton's "Cyclopædia of Agriculture," from which I have already quoted, it is stated that the large crops raised for a long time without necessitating continuous exertion, induced a low condition of the physical powers, which ultimately produced lazy and indolent habits, exceedingly prejudicial to the development of the intellectual powers of the mind. While the English and Scotch labourers were benefited by the introduction of potatoes into their dietary, and slowly improving in worldly comforts by this new addition to their daily food, the Irish peasant was making no progress, in consequence of his entire dependence on one particular kind of food.

In 1845 a very large extent of land in Ireland was under the potato crop, and in the summer of that year appeared that destructive disease the potato murrain, which destroyed the food of the lower classes, and threw them for support upon the charity of the Government and the liberality of the benevolent.

The frightful misery that ensued cannot be described; numbers died of starvation, and thousands who had the means and energy left the plague-stricken country, and emigrated to other lands.

The great distress and the high price of provisions caused the Government of the day to relax, and ultimately abolish, the duty on the importation of corn and other commodities, introducing Sir Robert Peel's principles of free trade, which no doubt has been a great blessing to the country at large, and in all probability was the means of preserving this kingdom from those revolutionary convulsions and political changes which swept over the continent of Europe in 1848: the people of this country having "a cheap loaf," remained contented and loyally attached to their Queen and constitution.

Humboldt, in his essay on the kingdom of New Spain, gives the history of the potato. He believes that the plant, under the name of Maglia, is the original stock of this useful vegetable, and that it grows in Chili, in its native soil. He supposes that it was transported by the Indians to Peru, Quito, New Granada, and the whole of the Cordilleras. Mr. Darwin states, in his "Natural History of the South Sea," 1840, that he saw the wild potato growing abundantly on the beach of the Chonas Islands. In the middle of January they were in flower, but the tubers were small and few in number, especially in plants which grew in the shade and had the most luxuriant foliage. "Nevertheless, I found one," says he, "which was of an oval form, with a diameter of two inches in length. The raw tubers had precisely the smell of the common potato of England, but when cooked they shrank, and became watery and insipid. They had not a bitter taste, as, according to Molina, is the case with the Chilian kind, and could be eaten with safety. Some plants measured from the ground to the tips of the upper leaf not less than four feet. There can be no doubt, from the state in which they grow, and being known to various Indian tribes scattered over the country, that they are indigenous and not imported plants." Mr. Lambert, in the tenth volume of Brande's Journal, and in the appendix to his splendid work on the genus Pinus, has collected many valuable facts which prove that the potato is found wild in several parts of America, and among others in Chili and Peru.

There are a great many varieties of the potato. Lawson, in the "Synopsis of the Vegetable Products of Scotland," describes 175 kinds, and they are still on the increase: it is stated at the present time there are between two or three hundred sorts. There are but few plants which exhibit such an endless diversity of character: locality and soil make all the difference. Some kinds that are esteemed to be of the best quality in one place, are almost unfit to eat in another.

The potato is, like all other plants, subject to disease. The two principal are the curl and the potato murrain, already alluded to. The curl first made its appearance in 1764, in Lancashire, where potatoes had been first introduced into British field-culture, and had been propagated without any change of seed. The name is very expressive of the appearance of the plant when under its influence; the leaves curl and crumple up, the stem becomes puny and stinted, and the tubers produced are small, and when planted propagate the disease to the future crop. The experiments of T. Dickson show that the disease arises from the vegetable powers of the sets planted having been exhausted by over-ripening, so that sets from the waxy end of the potato produce healthy plants, whereas those from the best-ripened ends did not vegetate at all, or produced curled plants. It is the opinion of Mr. Crichton that the curl may often be occasioned by the way potatoes intended for seed are treated. "I have observed," says he, "whenever the seed stock is carefully pitted and not exposed to the air in the spring, the crop has seldom any curl; but where the seed stock is put into barns and outhouses for months together, such a crop seldom escapes turning out in a great measure curled. If but a few curl the first year, and they are planted again, it is more than probable half of them will curl the next season." The years 1845 and 1846 will be rendered perpetually memorable as the time at which the potato murrain first appeared in a serious form in this country. This fungus (*Peronospora infestans*), according to MM. Gay and Acosta, has been known for ages in Chili and Bogota as attacking the potato, and in 1844 it proved most disastrous on the American continent, which has given rise to the idea that it was introduced here from the New World.

The cause and nature of the disease have baffled the ingenuity of the philosopher and the farmer. Many remedies have been tried, not only in this country, but on the Continent and in America. It appears that we are not much more acquainted with its nature than we were when it first showed itself. In Germany some of the scientific men have given much time and study to the subject; one of these, Dr. J. Speirschneider, has published his experiments and conclusions in the *Botanische Zeitung*, 20th February, 1857. He considered that the *Peronospora* attacked the leaves in the first instance, the ripe spores of which are cast off or carried by the rain into the soil when it is loose, and thus brought into contact with the tubers, where they germinate, under favourable circumstances, and finally induce decay. In dry seasons the disease is not so prevalent.

Other scientific men hold different views on the subject; they say that the disease is not caused by this fungus, but that it attends and accelerates it. Further researches into the nature of fungi may in time throw additional light upon this important matter.

The cultivation of the potato in Europe appears not to have attained to any extent till during the last century. It was introduced into Sweden in 1720; but, notwithstanding the exertions of Linnæus, it did not come into general cultivation till aided by royal edict in 1764. It reached Switzerland in 1730, and met with more favour; the inhabitants in a few years growing not only sufficient potatoes for their common consumption, but drying and grinding them into flour for bread. Its cultivation in Prussia began about 1738, and in Tuscany in 1767. In France its progress was very slow, and it was not until the middle of the last century that Parmentier urged its cultivation with so much success, that it was contemplated to give his name to the plant, and in 1793 the great scarcity of food did still more to extend its cultivation. The potato has been introduced into India. Bishop Heber, in his interesting journal, mentions several places, even in his time, where this root was successfully grown. At first this vegetable was very unpopular among the natives, but now they speak of it as being one of the best gifts they have ever received from their European masters. The Mussulmans in particular hold it in much esteem: they find it very useful as an absorbent in their greasy messes.

Humboldt states that the cultivation of the potato in the Andes extends to an elevation of 9,800 to 13,000 feet, higher than wheat. In the North of Europe it reaches beyond the limits of barley, and consequently all cereals: an early kind has been introduced into Ireland, where barley will not grow. In tropical regions, according to Johnstone's Physical Atlas, an elevation of 4,000 feet appears to be necessary for the growth of this root. It is successfully cultivated in Australia and New Zealand, which produces no excellent farinaceous root at all, not even the yam.

The potato contains large quantities of water,—75 per cent., and less flesh-forming properties than any other plant cultivated for human nourishment, and therefore ought never to form the staple article of diet; still there is no doubt that the use of this root is highly beneficial when taken with animal food. It is certain that scurvy, which was formerly common, has almost disappeared since the potato entered largely into the food of the population. Dr. Baly, the physician to the Millbank Penitentiary showed some time ago that scurvy was very prevalent in prisons from the dietaries of which potatoes were excluded, and did not exist where they were used. (See *Journal of the Statistical Society*, vol. x.)

Besides its value as a culinary vegetable, the potato is important in other respects. It contains a large proportion of starch, which is easily extracted, and there are extensive manufactories in this country and on the Continent for preparing this article. This starch has a beautiful white crystalline appearance. It is insoluble in cold, but soluble in boiling water. It is often sold for arrowroot, but can readily be detected; for arrowroot is not so white, and its grains are smaller; it is also free from that peculiar odour due to potato-starch. But it is said to be quite as wholesome and well adapted for invalids and persons of delicate constitutions as arrowroot. From this starch a substance is obtained, called dextrine, resembling gum in its appearance and properties. It is largely used in the arts for various purposes: the adhesive portion of our postage-stamps is composed of this substance. A size made from potatoes has a great advantage over common size for the purpose of whitewashing, as it does not smell, and it has a more durable whiteness. Yeast may also be made from these roots fit for the use of either the baker or brewer. In Russia a syrup or treacle, called potato-sugar, is extracted from the tubers, which is extensively used: it is very sweet, and resembles the sugar of grapes, but cannot be crystallized.

In France a spirit not unlike brandy is manufactured by distillation from the tubers, and a kind of oil is also obtained, which burns without smoke, but requires to be heated in order to continue burning. It has also been stated that the potato will clean linen as well as soap. A notice of thirty-one different uses to which this root can be applied will be found in the first volume of the *Gardener's Magazine*, page 436. The flour, or farina, of this plant is much used by the baker in bread-making, and when mixed with that of wheat it renders the bread more light, palatable, and digestible; for this purpose it is largely manufactured in the neighbourhood of Paris, where the excellence of the bread is very remarkable.

This valuable plant belongs to the family *Solaneæ* of Jussieu; almost all the species of which are of a poisonous and narcotic nature; as, Belladonna (Deadly Nightshade), Solanum (Common Nightshade), Henbane, &c.

The potato is a perennial herbaceous plant, rising with a slender branching stem to the height of two or three feet. The leaves are of a roundish form, of unequal size, and of a dark green colour, the petals white or of a purplish tinge; the fruit a large berry with a greenish pulp, which eventually changes to black, containing numerous small seeds in the centre. In its native state the plant is small, and the tubers seldom exceed the size of a walnut or common chestnut. They are also of a moist, waxy consistence and have a slightly bitterish taste. The tubers are not the real root of the plant, but true underground stems, and contain germinating points or eyes, from which young shoots spring forth. The number of acres in the United Kingdom under potato-cultivation, according to the Agricultural returns for 1871, was 627,691, and in 1872, 564,088; thus showing a large decrease in the cultivation. This is accounted for by the bad weather in some parts of the country at the planting season, and in others by a scarcity of labour at the time. A statement in the *Times*, 17th Feb., 1873, shows that the importation of this root is on the increase, for in January of that year the value of imported potatoes amounted to £282,303, and January, 1871, to £15,987; and the same month the previous year the declared value was only £222!

REMARKS ON THE HABITS OF THE SMOOTH NEWT.

BEING desirous of witnessing something of the habits of the smooth newt, on April 14th, 1873, I procured three of them, one male and two females. These I placed in a glass containing two gallons of water, in the middle of which I stood a small flower-pot, with water-plants, as *Anacharis alsinastrum*, water ranunculus, with frogbit and duckweed, which floated on the surface. This glass stood in my window, so that I had them continually before me while attending to my usual occupation. The study of these newts afforded me much pleasure. I now pen a few things among many that I have witnessed of their habits. To prevent their escaping by climbing up the side of the glass (which they are apt to do) I had a wire frame about four inches in height, covered with a muslin net, on the top of the glass. I kept the newts well supplied with water-fleas (*Daphnia pulex*), on which they feed readily. I think the want of food is the cause of their attempting to escape, in consequence of which many persons who wish to keep them often lose them. During the breeding time they are very active, and sometimes manifest a sort of inquisitiveness which has much amused me, for if I placed my pocket lens to the side of the glass with the view of making some observation, they would all three of them come and place their heads within the circle of my glass, as much as to say, "What

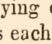


Fig. 70. Natural Size of egg of Newt.

Fig. 71. Leaves of *Callitriche verna* enfolding eggs of Newt.

are you looking for?" This they have repeatedly done during the time of laying their eggs. The laying of the egg is a curious operation to witness, as each egg is laid singly, and is folded in a leaf. They are laid at intervals during a month or five weeks, so that I have had them of all ages and sizes, from those just escaping from the egg to a month old. When about to lay an egg, the newt would examine several leaves before she found one to suit her purpose. In some cases the leaf has been too stout to bend with ease, such as the leaf of the frogbit, and after vainly trying to fold it, she would leave off. Sometimes she would fold two of the narrow leaves of *A. alsinastrum* or *Callitriche verna* round the egg, but the leaf of the water-ranunculus, being large and easy to fold, was most used. The manner of operation was this: after examining several leaves, and making choice of a suitable one, the would place that part of her body from whence the egg is about to protrude on to the leaf, and with her hind legs fold the leaf over and around that part in such a manner as to enable her to receive the egg into the leaf between the two legs, the body being bent forward for that purpose. As soon as the egg is laid, the body is slightly raised from it, to give room for the further and complete folding of

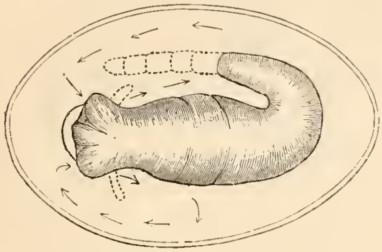


Fig. 72. Without the dotted lines, shows the growth of Tadpole eight days after the laying of the egg. The arrows indicate the current motion caused by cilia. The dotted lines show the increased growth at the eleventh day.

it in the leaf, and is then held in that position for about three minutes to insure its firm adhesion to the leaf. The female newt then swims away. I have sometimes seen her return to the recently-laid egg; and, as if not satisfied that all was as it should be, she would take the folded leaf, together with the enclosed egg into her mouth, pressing it gently to make sure it was in a proper and safe position. This I have seen the newt do to several eggs, the

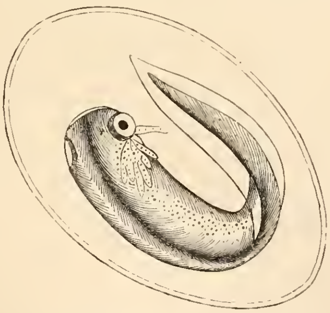


Fig. 73. Further development of Tadpole, seventeen days after the laying of the egg.

laying of which I witnessed. When first I saw her take the egg and leaf into her mouth, I apprehended she was going to destroy it; but not so. One of the eggs that I saw laid and then adjusted with her mouth, I took out from the glass, together with a portion of the plant on which it was fixed, and placed it in a glass cell $1\frac{1}{2}$ inch in diameter and $\frac{1}{2}$ inch in depth, so that at any time it could be placed under the microscope. In this way I was enabled to make the following observations. This egg was enclosed in a single leaf of *A. alsinastrum*, and was close to the side of the glass when laid which gave me a good opportunity for observation The eggs are oval in shape and transparent, so that the nucleus of the egg is plainly seen. At first this is quite round, and of a brown colour. In three days it becomes somewhat lengthened. The egg was laid April 17th, 1873, and the nucleus continued to grow up to April 25th, when the tadpole

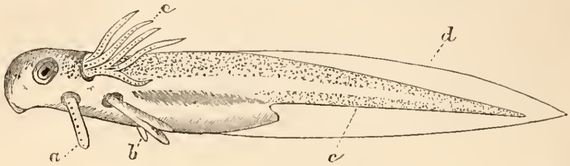


Fig. 74. Earliest stage of free Tadpole. *a*, claspers; *b*, fore-leg partly developed; *c*, circulation of blood; *d*, transparent fin; *e*, branchiate tufts.

within presented the appearance as shown in fig. 72. There was no appearance of the branchiæ at that time, but a constant circulation of the fluid contained in the egg was perceptible passing in the direction indicated by the arrows (fig. 72) over that part of the tadpole where the branchiæ were forming. This circular current is caused by vibratile cilia, and though too fine to be perceived, the action is very plainly seen, and as the branchiæ were developed, so the circular motion became more rapid. On April 25th the tadpole in the egg presented the appearance as shown in fig. 72 without the dotted lines. The dotted lines are intended to show the gradual and progressive growth of both the branchiæ and the tail, day by day, up to April 28th. It thus gradually increased in size and changed its form until May 4th, when it presented the form as in fig. 73, having at this period a far greater likeness to a fish than a reptile.

Fig. 75. Tadpole of Newt three months old.

The circulation of the blood through the branchial tufts while still in the egg was plainly seen, forming a pleasing sight; the tadpole, at intervals, changed its position in the egg by sudden jerks. On May 10th it burst the egg, and escaped into the water (fig. 74). At this early stage the circulation of the blood in the branchial tufts and other parts of the body is plainly seen, forming a beautiful spectacle, and can be witnessed by placing one of the tadpoles in a small shallow cell with just sufficient water to allow it to float. The action of the cilia is then very visible, causing a rapid current of water to pass over the branchial tufts in a direction from the head downwards, by which the blood, as it is seen coursing its way from the heart in one direction and returning by another, is purified and aërated. The blood is seen to move by a sort of regular pulsation which can be counted. The sooner after leaving the egg for observing this the better, as the tadpole is very transparent during the first two days. Before the fore-legs become visible, there are two appendages in form of minute claspers, one on each side of the mouth (fig. 74, *a*), by which, in absence of legs, they are enabled to hold on to any substance, and even in those minute claspers may be seen single corpuscles of blood passing and repassing. These appendages disappear in four or five days, when the rudiments of the fore-legs are seen, at first as two small lumps, which soon lengthen out, and three of the toes only appear at first (fig. 74, *b*), but gradually the foot is developed into its proper form. In this also the circulation of the blood is seen, as also in every part of the body, but especially in the branchiæ, and along the whole length of the under part of the body, from the tail up to the head (fig. 74, *c*). In about three weeks the hind-legs make their appearance, and when three months old the young are about an inch in length, forming a beautiful creature in the aquarium (fig. 75), the branchiæ at this time having the appearance of beautiful feathered plumes. As the young newts swim through the water they wave gracefully to and fro with the motion. The blood being red imparts colour to the branchiæ, and to all the more transparent parts of the body. In course of time the branchial tufts, and the large transparent fin (fig. 74, *d*) gradually diminish, and entirely disappear, the skin becomes thicker and darker in colour, and finally the reptile is perfected. During the breeding season the smooth newts are very prettily marked; the male, in particular, is beautifully spotted and coloured; but as soon as this is over they cast their skins, and assume a dirty brown colour. They cast their skins several times during a month. Sometimes it is thrown off in patches, at other times it comes off whole. I have one quite perfect which I saw cast off, and have preserved it between two pieces of glass. The skin begins to come off at the head, and is gradually pushed down towards the tail, and several times I have seen the newt take hold of the tail end of the skin with her mouth, draw it off, and by a few gulps swallow the whole. The young newt casts its skin before it is half grown. At the end of the breeding season, that sort of curiosity, or apparent inquisitiveness manifested by them, as before stated, leaves them; they no longer take notice of any one prying with a glass into their domain. The bright colours and spots disappear, together with the wavy crest from the back of the male. Both sexes change in their appearance, so that during the winter months I have been unable to distinguish the one from the other; but now, in March, 1874, they have again assumed the bright colours, and the male has again his beautiful crest tinged with orange-colour. They also again manifest their usual inquisitiveness by coming to the side of the aquarium whenever a pocket lens is applied to examine anything in the water.

James Fullagar.

Canterbury.

ON MANIPULATION WITH CANADA BALSAM.

The object of the present paper is not to revive the recent controversy respecting the best method of preparing and mounting microscopic objects in Canada balsam, but to aid students who, like myself, have been debarred from mounting as much as they would otherwise do, from the difficulty of avoiding air-bubbles in slides prepared with *hard* balsam. I shall first detail the method of mounting I have found by practice to be the best, and then I intend to state my objections to other methods of preparation.

The object must first be dried: this is necessary, and the neglect of it frequently causes the "cloudiness" often found in slides that have been mounted quickly. Objects may be dried in two ways: viz., by immersion in alcohol, or by exposure to a current of dry air: the first is by far the best. (See Davies on Mounting, second edition, p. 9.) After the object has been dried, it must be placed in benzole; this liquid is better for this purpose than spirits of turpentine, for reasons hereafter mentioned. The object of this soaking is to remove the air-bubbles which are almost always to be found in objects. This process will take from one or two days to several weeks, according to the size, &c., of the object. After the air-bubbles are thoroughly expelled, the object must either be touched with blotting-paper or drained for a short time upon a slide. Drop as much balsam diluted with benzole as may be required upon the centre of a clean slide, and then take the object with a damped camel-hair pencil, or a pair of forceps, and place it (the object) in the centre of the balsam. Then place the cover on, taking care to have it *in the centre*, and place the slide on a thick plate of iron or brass, and apply heat, by means of a spirit lamp, to the under surface of the plate. Care must be taken not to agitate balsam, as this would injure the object. Put the slide in a warm place to harden. Many advocate baking in a slow oven, but this is often injurious to objects, especially delicate ones. After the balsam is hardened, the slide must be cleaned (if care is taken in the mounting, very little superfluous balsam will be deposited on the slide), and a ring of varnish put round the edge of the cover by means of a turntable. The best mixture of this is the balsam in which the object has been mounted, as of course this does not run in: if desired, a rim of black varnish, composed of lamp-black and gold-size, can be added. Dr. Carpenter recommends the above as a good finishing varnish, as it is not brittle and dries very quickly. (See Davies.) Very thin objects, which are best floated on the slide, can be mounted by adding a drop or two of benzole to the object on the slide, and after a minute or two the benzole may be drained off, and the slide finished by adding balsam as above. I may add that balsam prepared with benzole may be obtained from Mr. Charles Baker, of 244, High Holborn, London.

I will now state my objections to other modes of preparation.

1. *Fluids to remove air-bubbles.*

Turpentine.—This is not so penetrating or cleanly as benzole, nor does it combine so readily with balsam.

Oil of Cloves.—This is so slow in evaporating that the balsam surrounding objects is soft for a long time after mounting.

2. *Various sorts of balsam.*

Pure Canada balsam.—The heat required to harden pure balsam is injurious to preparations of insects, cuticles, &c. This mode is also very troublesome, and does not permit of objects being arranged when on the slide, or of others being floated thereon.

Balsam diluted with chloroform is very often cloudy; the benzole used for expelling air-bubbles does not mingle with this preparation of balsam as readily as with balsam dissolved in benzole.

Advantages of balsam dissolved in benzole.—"If a few air-bubbles are left in the specimens when this balsam is used, they will disappear by next morning." (Davies on Mounting, p. 90.) "It may be safely affirmed that benzole will be found *in all* cases a more valuable solvent of Canada balsam than chloroform." (*Ibid.* 96.)

I dare say that mounting with hard balsam may be easy in the hands of a skilled microscopist like F. Kitton, Esq.; but in the hands of amateurs it is rarely successful.

There are some objects that are too bulky to be mounted in the ordinary way: these require a cell. In mounting such, proceed as follows:—Fill a glass cell with benzole, and place the object, freed from air-bubbles, in the cell; then pour balsam diluted with benzole into the cell, at the same time inclining it. The benzole will give way to the balsam; when full of balsam, place the cover on the cell. It can easily be done so neatly as to require no cleaning.

I should advise all students who are bothered with hard balsam to give my plan a trial, and I believe it will not disappoint them.

Caverswall. WM. SARGANT, Jun.

ON THE STRUCTURE OF THE MOUTHS OF INSECTS.

(*Continued from p.* 232, *No.* 106.)

BY B. T. LOWNE.

THE mouths of butterflies and moths exhibit a still more considerable deviation from the typical form, already described, and the nature of this modification is far more difficult to trace, owing to the very remarkable developmental history which these creatures exhibit.

In the earlier embryonic stages of the grub or caterpillar, the development of the mouth-organs is precisely similar to that of the limbs and mouth-organs of crustacea and other insects. Little buds or protuberances appear on each side of the ventral furrow (see fig. 146, p. 230, No. 106), but these remain rudimentary in the grub, and only show traces of segmentation, although they are generally terminated by a well-developed claw—such are the maxillæ (fig. 76 and 77, *mx' mx''*) of the cossus caterpillar, and of all lepidopterous larvæ, as well as the antennæ and feet. A single pair, the mandibles (figs. 76 and 76), *md*, become functionally perfect for the purposes of nutrition, and take the same form as the mandibles of the beetles and other gnawing insects.

The other parts of the mouth of the lepidopterous larvæ are equally simple, and consist of a narrow shield-like labrum or upper lip, and a lower lip, the labium, prolonged into a long, narrow tube, divided into two behind, but single at its orifice, which serves the purpose of a spinneret. Through this the liquid silk is forced, to become hardened at its apex, into the thread with which they weave their cocoons. The hooks on the maxillæ and on the thoracic legs serve to guide the silk after it is formed.

It will be remembered that there is a material difference between the silken threads of spiders and of lepidopterous larvæ; for, although both are formed by the exposure of a viscid fluid to the action of the air, under which it immediately solidifies, the silk fluid in the spider is forced through four abdominal papillæ, pierced by several thousand extremely minute openings, so that a compound thread, consisting of as many strands, is formed. That of the caterpillar, however, is extruded through a single tubular opening, and thus forms a simple thread. We see here the same end attained by very different anatomical structures; one exceedingly complex, the other comparatively simple, yet the thread of the silk-moth is even more perfect than that of the spider, although it is formed by the less complex apparatus. In the former case, the silk fluid has become wonderfully adapted to fulfil its purpose, so that a comparatively great strand hardens instantaneously, whilst in the latter its solidification is brought about with great rapidity, by a most elaborate spinning apparatus.

Although the mouth of the larva of the Goat-moth (*Cossus ligniperda*) serves well enough as an example of the gnawing and silk-spinning mouths of the lepidopterous larvæ, which are all very similar, that of the adult Goat-moth will by no means serve as an example of the mouth of the adult lepidoptera, for, from the entrance of the larva into its pupa state, the mouth retrogrades in its development, and undergoes atrophy or wasting in this insect, so that the adult moth is without the means of feeding.

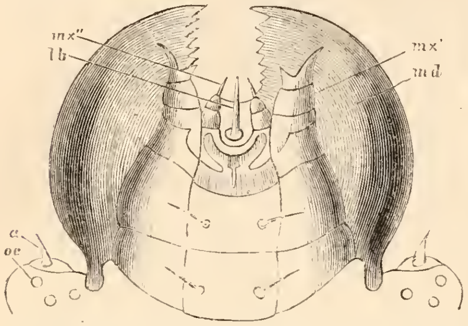


Fig. 76. The mouth of a Lepidopterous larva seen from below. *a*, antennæ ; *oc*, ocelli ; *lb*, labium ; *mx'*, *mx''*, *md*, maxillæ and mandibles.

In most lepidoptera, however, a very perfect suctorial mouth is developed, so different from that of the larva, or indeed from that of any other class of insects, that its parts are only recognized with difficulty and uncertainty, except when their development is most carefully watched ; and all their relations with each other are examined with great patience.

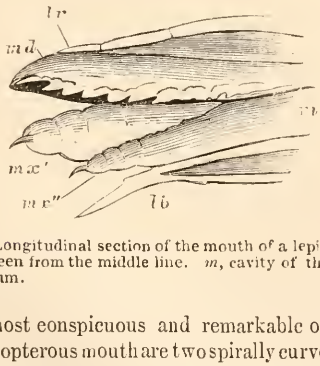


Fig. 77. Longitudinal section of the mouth of a lepidopterous larva, seen from the middle line. *m*, cavity of the mouth ; *lr*, labrum.

The most conspicuous and remarkable organs in the lepidopterous mouth are two spirally curved multi-segmented half-tubes (fig. 78, *s*). These are called the *antlia* or pumps ; they lie side by side, and form together a complete tube ; they are exceedingly movable, all their joints being endowed with muscles like those of the tongue of a bee. The antlia are not covered by hairs like the bee's tongue, but have scales at intervals, especially towards the terminal extremity, where these frequently form a kind of brush. The sides of the mouth are furnished with a pair of great jointed organs called palpi (fig. 78, *p*), covered with a profusion of beautiful scales. At the base of these organs a pair of small curved plates lie, one on either side of the antlia. The labrum is rudimentary, and the labium is apparently wanting, or represented only by the anterior edge of the floor of the mouth.

The interpretation of the nature of these organs is a matter of no little difficulty, and the reason of this is, as has been already stated, that the changes in the pupa stage of the life of a lepidopterous insect are exceedingly remarkable. Certain pouches built of very delicate cells, exist in the head of the larva: these were first fully described by Landois, in Germany, and are now well known in this country as Imaginal discs. The origin of these structures is most difficult to trace ; but they are derived, I think there can be little doubt, from the inner layer of the cellular integument of the nipple-like projections, which, as we have already seen, are the first rudiments of the mouth-organs of insects.

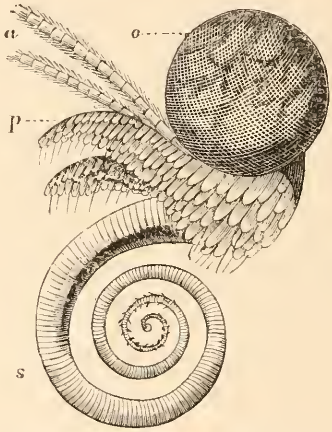


Fig. 78. Side view of the head of a moth, showing the compound eyes, *o* ; the antennæ, *a* ; the palpi, *p* ; the antlia, *s*.

The little pouches or discs, originating in this manner, remain, however, soft cellular structures, and grow but little during the earlier stages of larval life. As the larva grows, they become detached from the organ from which they were originally derived, but retain their connection with certain nerves and tracheal vessels. When the larva ceases to feed, they undergo rapid development, and gradually unfolding, spread out, and form a new integument within the larva. This becomes the pupa-case, with its several pouches moulded into the forms of the wings, legs, and the mouth-organs of the perfect insect. There is no more delicate or difficult task than to trace all the changes of the imaginal discs from their earliest appearance in the embryo of the larva within the egg, to the ultimate formation of the pupa-skin by their agency.

We may summarize these wonderful changes in this way. A number of parts become doubled in the embryo, as far as their integument or skin is concerned, so that they have an inner skin and an outer one. The inner skin becomes detached and remains as an organ of reserve for the formation of the pupa. The outer one undergoes immediate development, and forms the exterior of the larva; the inner one awaiting its proper time to take up the developmental history from the early embryonic period after the outer one has played out its part. The larval period is, as it were, a period grafted in

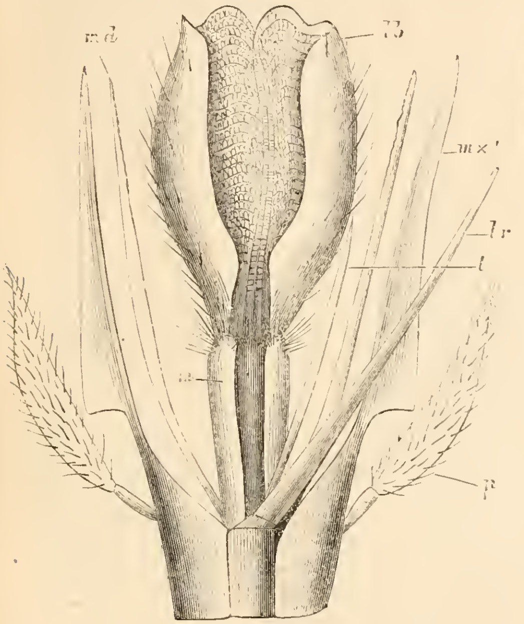


Fig. 79. The mouth of the Gadfly (*Tabanus*), seen from above. *m*, mentum; *l*, ligula; *p*, maxillary palpi; *md*, the principal lancets.

between the embryo and the imago, without affecting the development of the latter to any material degree. Strange as such a phenomenon may appear, it is by no means confined to insects; something of the same kind occurs frequently amongst star-fishes and other echinoderms, in many worms, as well as in some few crustaceans.

Without attempting to trace the complex phenomena attending this mode of development, enough has been done to show the extreme difficulty which occurs in determining the exact nature of the various organs in the butterfly's mouth.

Most authors have hitherto agreed in describing the antlia, or spiral sucking organ, as a modification of the great maxillæ of other insects, and the large-jointed palpi, *p*, as labial palpi. A more careful examination of the developmental history, and of the relations of these organs with the other parts of the mouth, shows clearly, however, that this is not the case. The antlia are undoubtedly a modification of the second pair of maxillæ—indeed they are identical with the paraglossæ of the bee,—whilst a comparison with the mouth-organs of the fly shows clearly that the so-called labial palpi are really maxillary palpi, a view which is borne out by their anatomical relations. The critical examination of this question is one of extreme difficulty, and would, therefore, be out of place in SCIENCE-GOSSIP.

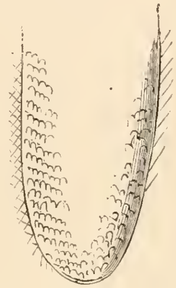


Fig. 80. The extremity of the principal lancets of the Gadfly.

The adaptation of the nectaries of flowers, and of their reproductive organs, to the antlia of lepidoptera, is one of the most remarkable and beautiful of Nature's works. Every tyro knows how de-

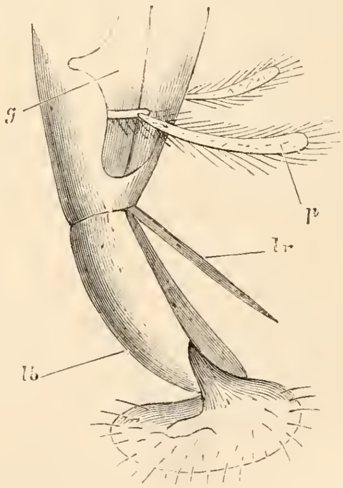


Fig. 81. The proboscis of the common House-fly, with the labrum dislocated from its groove.

structive the ravages of lepidopterous larvæ are, and yet we must probably thank the perfect insects for the great glories of the floral world; for, as Charles Darwin has pointed out, it is only amongst plants which require, or are greatly benefited by insect agency, in the process of fertilization, that we find beautiful and conspicuous flowers. The nectar-seeking lepidoptera carry the pollen from flower to flower, and thus insure cross fertilization; hence conspicuous and beautiful flowers are beneficial to the plants, and would assuredly arise in the course of time. Moths are the chief, if not the only agents by which the fertilization of most orchids is attained.

Passing from the lepidoptera to the diptera, or two-winged flies, we find another very remarkable modification of the mouth-organs, and it is amongst these insects that microscopists seek and find some of the most interesting and beautiful objects, which are favourites with those who only use the microscope as an amusing toy, owing to their curious forms and delicate structure.

In the mouth of the adult dipterous insect the labium is again enormously developed, but it is prolonged, together with the anterior parts of the head, into a kind of trunk or proboscis, and this folds on itself with a knee-like joint.

The terminal portion of this proboscis consists almost entirely of a large fleshy labium, grooved above, and closed as far as the extremity of the groove by a long narrow labrum, or upper lip. The extremity of the labium beyond the groove forms a pair of more or less developed lobes, united behind, and capable of being used as a sucker (figs. 79 and 81). These suctorial lobes differ exceedingly in structure and magnitude in different diptera. In the house-fly and its allies they are simple, and folded together like a closed book when at rest; but in the bloodthirsty gadflies they are so large that they are rolled up when not in use (fig. 79).

The mouth of the gadfly will serve as an excellent starting-point in the study of the dipterous mouth. The numerous lancets seen in the fig. 79, when at rest, lie in the groove of the labium, and are protected by the great scale-like maxillary palpi, *p*. The lancets are, first, the outer lobes of the great maxillæ *mx'*, closely similar to the same parts in the mouth of the bee; secondly, a pair of sharp-pointed curved organs, *md*, rough on the surface like a minute rasp, and finely-toothed at their edges (fig. 80); these probably represent the labial palpi, but, according to some, are modified mandibles; lastly, the sharp labium and the fine and equally sharp ligula,—in all, six in number, a formidable and much-dreaded arsenal of small arms. The efficacy of the labial palpi as organs of offence may be easily judged by examining their rasp-like extremities with a quarter-inch objective (fig. 80).

(*To be continued.*)

"We must entirely dismiss the conception that mere anatomy by itself can have any decisive bearing on the question as to man's nature and being as a whole."—Mivart's *Man and Apes*.

MICROSCOPY.

Mounting Mosses, &c.—I cannot venture to say what may be the "best" way to mount leaves of mosses, &c., but I have found mounting them in fluid quite satisfactory, and have specimens mounted about eighteen or twenty years ago in perfect order. The cell consists of a ring of Brunswick black formed on a Shadbolt's turntable. It must be made sufficiently deep. The fluid is then dropped in, the object and cover adjusted, superfluous moisture drawn off with blotting-paper *till the cover sticks by suction.* The slide is then carefully adjusted on the turntable, and sealed in with as little Brunswick black as will cover the junction of cover and cell. This sealing must be closely examined all round and made perfect. When this is dry, it should be repeated till a firm smooth ring covers more than the edge of the cover, and at least half of the projecting wall of the cell. A skilful operator will seal in objects in one process, or two at the most; but this requires experience as to the consistency of the Brunswick black, &c. The cell must be perfectly level (as it will be if the black is fluid enough and clean), and the cover should reach to about half the width of the cell-ring. If I remember rightly, I used indifferently for fluid, proof spirit $\frac{1}{10}$, distilled water $\frac{9}{10}$ (even weaker); naphtha and water; acetic acid and water—both very weak, and mixed by guess. I strongly suspect that the proportion signifies little if the mixture is but weak enough. *Tetraphis pellucida* thus mounted, the whole plant, root, gemmæ, and all, is a most beautiful object; but it mounts well in balsam if carefully dried, and in this retains its lovely colour, which is lost in fluid. Sphagnum-leaves mount well in fluid. Many mosses mount well in balsam, if carefully dried first. Coaguline was not used in my day, and I do not know it.—*E. F. S.*

Query about Microscopes. — The mechanical stage is much superior to any other form of stage, but it makes a somewhat heavy addition to the cost of the microscope. It is almost indispensable when the higher objectives are used, viz., from an $\frac{1}{8}$ upwards. The next best would be either the sliding and rotating or the lever-stage; with careful manipulation an $\frac{1}{8}$ can be used with either form. A good working instrument can be had without a mechanical stage, which can be added at any future time. The cost of a really useful stand, to which additions could be made from time to time, would be (if monocular) about £6. 15s. without mechanical stage, which would entail an additional cost of £2. A binocular, with circular rotating stage and rack-adjustment to eye-pieces, would cost about £7. 10s. With respect to objectives, it is always desirable to have the best, if the cost is no object; but where it is, Gundlach's objectives are generally very good.

Baker's student's quarter is a most excellent lens for the price. Swift has also lately introduced some capital glasses at a moderate cost, particularly his $\frac{1}{6}$ and $\frac{1}{8}$. None of these objectives possess the high angular aperture of the costly glasses of Ross, Beck, Powell and Leland, and others, but where only a moderate angle is required, they are all that can be desired. The apparatus that may be considered almost a necessity are as follows:—Spot lens; Luberkühn's, to powers below $\frac{1}{2}$ inch; dark-wells and holders, extra eyepiece; bull's-eye condenser; disc of diaphragms; the entire cost would range from about £12 to £16; a cheaper stand and dividing objectives would cost about £5 to £10; anything of less cost would be of little practical use. —*F. Kitton.*

Microscopic Analysis. — I should be obliged by some of your numerous correspondents giving me a few practical details for the preparation of powders, &c., previous to their examination microscopically for analytical purposes. I can find no directions in any of the manuals. This subject is becoming an important one for public analysts.—*B. G. Lomax.*

The Eozoon Controversy. — The debate as to the organic origin of this object has been again revived, through an article which appeared in a recent number of the *Annals and Magazine of Natural History*, by Mr. H. J. Carter, in which that gentleman expressed his disbelief in the animal origin of *Eozoon*, founded on a specimen he had examined. In the last number of the same magazine, Dr. Carpenter returns to the charge, and writes what we consider the best and clearest article he has yet given on the subject. After perusing Dr. Carpenter's paper, it is difficult to turn away the conclusion that *Eozoon* was a true foraminifer, abnormal in many respects, but not more so than the *Parkeria* of the Greensand. In the same number is an abstract of a paper by Prof. Max Schultze, on the *Eozoon Canadense*, in which that celebrated microscopist gives the result of his own examination of original specimens, and the conclusion he has arrived at is that there can be no serious doubt as to the foraminferous nature of *Eozoon*.

ZOOLOGY.

The Relationship between the Echinothuridæ (Wyville Thomson) and the Perischoechinidæ (McCoy).—At a recent meeting of the Geological Society, a paper on the above subject was read by R. Etheridge, jun., F.G.S. The author referred in the first place to the peculiar characters of the genera *Calveria* and *Phormosoma*, Wyville Thomson, and especially to those in which they approach the cretaceous genus *Echinothuria*, S. P. Woodward, and which led Prof. Wyville Thomson to include these three forms in his group Echinothuridæ. He remarked that an overlapping of the interambulacral plates, more or less like that occurring in these three genera, is met with also in *Archæocidaris*, McCoy, and *Lepidechinus*, Hall, belonging to the group of palæozoic Echini, which McCoy proposed to call Perischoechinidæ, and which is characterized by the presence of more than three rows of plates in the interambulacral areas. As there is no overlapping of these plates in the other genera referred to this group, it includes two types of structure. The author then discussed the characters presented by the test in the genera of the Perischoechinidæ (namely *Archæocidaris, Palæchinus, Perischodomus, Lepidechinus, Eocidaris, Melonites*, and *Oligoporus*), and pointed out that although we have no conclusive evidence of the presence of membranous interspaces along with the overlapping plates in *Archæocidaris*, the fragmentary condition in which the remains of that form are usually found would lead us to infer their existence. No known palæozoic genus exhibits the want of distinction between the ambulacra and interambulacra on the ventral half of the test seen in the recent genus *Phormosoma*. In *Melonites* and *Oligoporus* the author described an increase in the number of rows of plates in the ambulacra, and he indicated that all the Perischoechinidæ differ from the later Echini by the increased number of perforations in the ocular and genital plates. In the discussion which followed the paper, Mr. Etheridge, sen., described *Calveria* as resembling an elastic ball rather than an ordinary Sea-urchin, its calcareous plates being held in place by a flexible membrane, and as connecting the ordinary forms with *Echinothuria*, in which the plates slide over one another like armour. He remarked that the apical disks vary in each genus; in the palæozoic genera the ovarian plates have three or more and the ocular plates two perforations. The interambulacral areas in the palæozoic genera have invariably more than two rows of plates. In *Archæocidaris* the plates have bevelled edges. The chief point of the paper was its indicating that a type supposed to have been long extinct is still represented in our seas. Mr. Seeley observed that the buccal membrane in the recent Echinida has overlapping plates, so that if the development of the plates usually forming the remainder of the test were arrested, forms would be obtained approaching those described in the paper. He stated that in his opinion both the Echinoderm type and the Brachiopod type have analogies with the Annelids. Mr. H. Woodward remarked that of the Holothuridæ some forms, such as *Psolus*, are protected by calcareous plates having perfect freedom of motion. Mr. Gwyn Jeffreys added that *Calveria hystrix* was dredged off the Faroe Islands, and subsequently in the Bay of Biscay. He remarked that many missing links will probably be found hereafter, and that nomenclature will be benefited thereby; thus if *Echinothuria* and *Calveria* really belong to the same genus, one of these names may be discarded. In support of this view he stated that the palæozoic *Euomphalus* is identical, as regards the characters of the shell, with the recent *Homalogyra*.

Bees and Wasps.—Sir John Lubbock who, it will be remembered, gave some practical proofs of his acquaintance with wasps at the Brighton British Association Meeting, has just read a paper on the above subject at the Linnean Society. The paper commenced by pointing out, with reference to the power of communication with one another said to be possessed by Hymenoptera, that the observations on record scarcely justify the conclusions which have been drawn from them. In support of the opinion that ants, bees, and wasps possess a true language, it is usually stated that if one bee discovers a store of honey, the others are soon aware of the fact. This, however, does not necessarily imply the possession of any power of describing localities, or anything which could correctly be called a language. If the bees or wasps merely follow their fortunate companions, the matter is simple enough. If, on the contrary, the others are sent, the case will be very different. In order to test this, Sir John kept honey in a given place for some time, in order to satisfy himself that it would not readily be found by the bees, and then brought a bee to the honey, marking it so that he could ascertain whether it brought others or sent them, the latter, of course, implying a much higher order of intelligence and power of communication. After trying the experiment several times with single bees and obtaining only negative results, Sir John Lubbock procured one of Marriott's observatory-hives, which he placed in his sitting-room. The bees had free access to the open air; but there was also a small side or postern door which could be opened at pleasure, and which led into the room. This enabled him to feed and mark any particular bees; and he recounted a number of experiments, from which it appeared that comparatively few bees found their own way through the postern, while of those which did so the great majority flew to the window, and scarcely any found the honey for themselves. Those, on the contrary, which were taken to the honey, passed backwards and forwards between it and the hive, making on an average, five journeys in the hour. Sir John had also, in a similar manner, watched a number of marked wasps, with very similar results. These and other observations of the same tendency appear to show that, even if bees and wasps have the power of informing one another when they discover a store of good food, at any rate they do not habitually do so; and this seemed to him a strong reason for concluding that they are not in the habit of communicating facts. When once wasps had made themselves thoroughly acquainted with their way, their movements were most regular. They spent three minutes supplying themselves with honey, and then flew straight to the nest, returning after an interval of about ten minutes, and thus making, like the bees, about five journeys an hour. During September they began in the morning at about six o'clock, and later when the mornings began to get cold, and continued to work without intermission till dusk. They made, therefore, rather more than fifty journeys in the day. Sir John had also made some experiments on the behaviour of bees introduced into strange hives, which seemed to contradict the ordinary statement that strange bees are always recognized and attacked. Another point as to which very different opinions have been propounded is the use of the antennæ. Some entomologists have regarded them as olfactory organs, some as ears, the weight of authority being perhaps in favour of the latter opinion. In experimenting on his wasps and bees, Sir John, to his surprise, could obtain no evidence that they heard at all. He tried them with a shrill pipe, with a whistle, with a violin, with all the sounds of which his voice was capable, doing so, moreover, within a few inches of their head; but they continued to feed without the slightest appearance of consciousness. Lastly, he recounted some observations showing that bees have the power of distinguishing colours. The relations of insects to flowers imply that the former can distinguish colour; but there had been as yet but few direct observations on the point.

British Spiders.—At a recent meeting of the Linnean Society, the Rev. O. P. Cambridge gave a systematic list of these insects. He said that during the last five years a constant communication and interchange of typical examples of spiders has been going on between Dr. T. Thorell, of Upsala, Dr. Koch, of Nürnberg, M. Eugène Simon, of Paris, and himself, and others, with a view to the determination of the synonymic identity of the species recorded as indigenous to Europe, but principally to Sweden, France, Germany, and England. The result of this investigation have been published by Dr. Thorell in a most exhaustive work lately completed, "On the Synonyms of European Spiders." The effect of this work is to give priority to names of many British spiders described by Mr. Blackwall and the writer other than the names they bear in the works of those authors. The time therefore appears to have arrived when a list, complete to the present time, of the known spiders of Great Britain and Ireland under the names to which, according to the laws of priority, they appear to be entitled, seems to be a desideratum. Dr. Thorell gives a list of British spiders; but it is complete only to the date of Mr. Blackwall's work, "Spiders of Great Britain and Ireland," since the publication of which the number of known indigenous species has increased by nearly one half. The systematic arrangement of Mr. Blackwall has not been adopted in this list, appearing, as it did, to be too artificial and based on insufficient (though in some respects convenient) characters, and, moreover, never to have found favour with other araneologists. The present arrangement (though it has no pretensions to finality) is the result of a long and tolerably careful study of spiders from many and widely distant regions of the world. It begins at the opposite end to that where Dr. Thorell and Dr. Koch begin their systematic arrangements; but it is, in the main, not very discordant with that of the former of these authors, as put forth in his valuable work "On the Genera of European Spiders," a work to which Mr. Cambridge is indebted for many most valuable hints on the classification of the Araneidea.

Anatomy of the Menobranchus.—At a recent meeting of the Zoological Society, Professor Huxley read a memoir upon the structure of the skull and of the heart of *Menobranchus lateralis*, describing the structure of the bony skull in the osteocranium, and giving a full account of the primordial skull or chondro-cranium, which has not hitherto been noticed. The chondro-cranium was compared with that of *Proteus*, and that of larval frogs and tritons, and its essentially embryonic character was indicated. The chondro-cranium was further shown to be formed by the coalescence of three distinct classes of elements which were termed *parachodral*, *pleural*, and *paraneural*. The heart was described, and the septum of the auricles was shown to be an open net-work allowing of free communication between the right and left auricular chambers. The structure of the *truncus arteriosus* was compared with that observed in other Amphibians.

Economic Value of Alligators.—Mr. J. G. Mitchell states in the last number of the *Zoologist*, that those large animals the Alligators, which are so abundant in the rivers of tropical America, are now being utilized. Large bales of their skins are being imported into France and Hamburg for the manufacture of large over-all boots.

A Male Nurse.—The *Philadelphia Medical Times* says that the *Lepus Bairdii* is a peculiar species of rabbit which is found in the mountains near the three Tetons of Wyoming and the heads of the Snake River and the Missouri. One of its peculiarities is the habit which the males have of suckling the young. Numerous specimens of this sex were obtained by the naturalists of Hayden's geological survey of 1872, with well-developed teats and mammary glands filled with milk.

BOTANY.

How to Skeletonize.—The way to prepare skeleton leaves is to lay them in rain-water for two or three months, and let the leaves be a good size. After they have been in the water the proper time, take them out gently, for fear you split them, and put them into some clean water. Then put the leaves one by one on to a card or the palm of your hand, and with a very soft and clean camel-hair brush or the tip of your finger, dab the leaf gently until all the green part comes off. Afterwards put a small teaspoonful of chloride of lime into about half a pint of cold water, and then leave the skeletons in the lime and water until they become very nearly white; then take them out very carefully with a card, and lay them on a clean piece of blotting-paper in the sun to dry. In preparing the poppy-heads you require to be still more careful than with the leaves. They must have separate water from the leaves, and must be covered up and not have a bruise in them. When they have been soaked long enough, you must take them out by the stalk, and with a small pair of pincers you must take all off the outside until you come to the skeleton, and then make a little hole up by the crown and take the inside out little by little, so that you cannot break the skeleton in doing so. The bleaching process is exactly the same as bleaching the skeleton leaves.—*M. L. W.*

Eryngium maritimum (Sea Holly) a Seaside Plant.—In considering what will best bear the cutting winds and saline vapour of the seaside, it should be borne in mind that there are certain herbaceous and ornamental plants as well as shrubs which come under the above description; for instance the Thrift (*Armeria maritima*) is common as a small border plant; it grows abundantly near Brighton on the shore shingle by the road to Shoreham which it partly covers. The *Eryngium maritimum*, an umbelliferous plant, though seldom cultivated, is an herbaceous evergreen with pretty hemispherical blue flowers; it is indigenous on sea sands on the coasts of England and elsewhere; it grows in great abundance on the sands at Ostend, where I was much struck with its beauty: it is a foot and a half high, with leaves of a glaucous hue, very stiff and prickly, like the holly-leaf, and probably for that reason not a favourite in gardens. Its extensively creeping roots were formerly converted into sweetmeats, and candied "Eringo root" is still to be obtained in some places: it formed in Shakespear's time the "kissing comfits" of Falstaff: Linnæus says the tops are eaten like asparagus in Sweden. Its medicinal powers, which were at one time highly extolled, are now in no repute. The leaves and flowers, being remarkably strong and durable, are frequently employed as fit subjects for skeleton bouquets. I do not know if the *Eryngium alpinum*, a smaller plant, would succeed near the sea; it is very hardy in the Swiss Alps, with a fine blue tint not only in the flowers but on the upper part of the stem also, as in the *Eryngium Bourgati* of the Pyrenees and the *Eryngium amethystenum* of Eastern Europe, so named on account of its brilliant blue colour, for which it is not unfrequently cultivated in gardens. I have no doubt there are other evergreen herbaceous seaside plants if the readers of SCIENCE-GOSSIP would draw attention to them.—*T. B. W., Brighton.*

NOSTOC COMMUNE.—Every autumn and winter for many years past I had looked in vain for the curious plant I am about to describe, when suddenly, one afternoon in November last, on my returning home after a storm of rain, I was surprised and delighted to see a number of specimens of various sizes and forms on the gravel paths of my garden. I had seen nothing of them previously, and I am quite sure they were not there when I walked down the garden path only an hour or two before. Perhaps I should say *apparently* they were not there, for of course their germs or dried skins must have been on the gravel unobserved by me, awaiting only the revivifying power of rain to cause them to swell into visible life, and so suddenly, as to justify the name of "fallen-stars," by which they are known in some country places, where certain of the species occur rather plentifully. The name of "fallen-star" has reference rather to their sudden appearance than to their lustre, although with dew or rain-drops upon them, especially in the sunshine immediately after a shower, they have a pretty glittering appearance, being semi-transparent and of a jelly-like consistency. The only way to preserve these soft gelatinous plants, is to wash them until they are free from dirt or grit, and to mount them on paper-like the softer species of marine algæ. In this manner their colour and appearance are preserved, although they must necessarily be pressed flat. The name of the order to which these curious plants belong is *Nostochaceæ*. I can find no explanation of the word, but it was first used by Paracelsus, and afterwards by Vaucher and other botanists. The plants in this Order are described as green, chiefly fresh-water, rarely marine, algæ, composed of moniliform filaments, lying in a gelatinous matrix. The filaments are formed of globose cells, here and there interrupted by a single cell of a different character, hence called "heterocyst." The propagation is by zoospores or active granules. There are no less than eight genera in this Order. These plants are sometimes furnished with firmly gelatinous, but never truly membranaceous, fronds of definite outline, variously lobed, or sometimes extending into irregular branches. Some of the species are mere masses of jelly or slime, through which filiform strings of closely-packed cells are dispersed. The endochrome, or colouring matter of the cells, is either a bright green or a dark olive-green; the fructification takes place in some privileged cells of the internal filaments (the heterocysts already referred to), which are sometimes in the centre of some, and occasionally at the ends of others. One division is terrestrial, all the species being found on gravelly soils, in garden walks, on rocks, and in pastures, in autumn and winter. In dry weather they shrivel up and appear like crimped bits of goldbeater skin, but expand after showers into the jelly-like masses already described. The type of this division is *Nostoc commune*. The frond is expanded and softly membranaceous; it is sometimes plaited, and waved or curled; it is irregular in size and form, and of a deep olive-green. Since I first met with this plant last autumn, I have watched its curious alternating appearance and disappearance with great interest, and I have been surprised at the length of time it has been present in my garden; numbers of the "little bits of green jelly" as the gardener called them, being dotted about in all directions, but always on the gravel. However, they have vanished for this season I believe, for the summer "tidying-up" has taken place, the paths have all been scraped, and my cherished "bits of jelly" have been ruthlessly swept from my sight.—*W. H. Grattann.*

NITOPHYLLUM VERSICOLOR.—Among the curious facts connected with algology that have come under my notice during my residence in Torquay, nothing has interested me more than the discovery of the very rare species *Nitophyllum versicolor*, which I took on the beach in Torbay, about the end of March, and again on the 2nd of April. In each instance the plants were fully grown, of the normal form, very prettily lobed, and with the characteristic stem and root. They were not in fruit; but as the specimens I found were fully grown, I am in hopes of finding others ere long, which may prove to be fertile. The winter here has been unusually mild, warm weather being favourable for the growth of the finer kinds of algæ; and as this rare species of *Nitophyllum* has thus suddenly made its appearance here, it has doubtless arisen from a spore, and thus I am in expectation of finding spore-producing specimens, similar to one which was found in fruit some years ago at Ilfracombe. Hitherto I believe this rare Rhodosperm has been taken only on the north coast of Devon and at Minehead in Somerset; its occurrence, therefore, on the south coast of Devon is extremely interesting, and I take this opportunity of recording the fact for the benefit of those readers of SCIENCE-GOSSIP who may be interested in the study of Marine Botany.—*W. H. Grattann.*

THE "LONDON CATALOGUE."—In answer to Mr. J. A. Stewart, the numbers in the "London Catalogue of Plants" are taken from Watson's Compendium of the "Cybele Britannica," in which work seven lines are devoted to the distribution of each species. If Mr. Stewart will consult this, he will no doubt find what he cannot at present understand, cleared up, as, for instance, that an 0 has slipped out in printing after the 8, under *Hypericum humifusum*.—*J. G. Baker*.

Seaside Shrubs.—*Atriplex Halimus* often attracts the attention of visitors to St. Brelade's Bay, in the island of Jersey, by its singular grey foilage. It forms there dense hedges, growing luxuriantly in the sandy soil wherever it is planted. It reaches a height of from four to six feet. I am not aware whether it is used in England, but I should think it would grow well on the southern coasts. Certainly there is no difficulty found with the plant in Jersey. Rows of *Lavatera* are sometimes planted as a garden hedge by the cottagers, though I presume neither that plant nor the still more remarkable Jersey cabbage, has any claim to be reckoned a "seaside shrub." In Scotland a belt of elder is often used to shelter the seaward aspect of a young plantation. Under the influence of the sea-wind the elder grows dense and bushy.—*J. J. M.*

On the Bracts of Crucifers.—M. T. Masters, Esq,, M.D., F.R.S., has recently read a paper on this subject before the Linnean Society. The subject was divided by the writer into two branches :—1. The absence of bracts in Crucifers. In the majority of cases this is so complete that even in the earliest stages of development observed by Payer no trace of bracts is seen. Different explanations of the phenomenon have been given by different morphologists. A. P. de Candolle attributes it to congenital suppression of the parts; Godron to pressure acting from within outwards, resulting from the dense manner in which the young flowers are packed together; Norman and Eichler consider that the bracts are abortive, but potentially present, the latter writer combating Godron's view by the consideration that on the one hand the bracts are absent where the inflorescence is so loose that no pressure can be exerted, and, on the other hand, in some cases where the flowers are densely crowded the bracts nevertheless exist. 2. The occasional presence of bracts in Crucifers. About fifty illustrations of this were named. A few species, as *Sisymbrium supinum* and *hirsutum*, have normal bracts to every flower; in others their occurrence is only occasional. Where the raceme shows a tendency to branch into a panicle, they may often be found at the base of the secondary divisions of the inflorescence; in *Arabis turrita* the lowermost peduncles have bracts at their base; the intermediate ones have bracts springing from their outer surface above their base, while the uppermost have none at all. The writer then discussed the various theories which have been proposed to account for the variation in the position of the bracts when present; viz. at the base or on the side of the flower-stalk above the base. The causes assigned for the latter apparently anomalous position were stated by different botanists to be the following:—1. Partition or subdivision of the axis; 2. congenital union, or lack of separation between the bract and the pedicle; 3. upraising of the bud and its bract. Anatomy gives no evidence of partition; but it does afford in some cases the evidence of fusion, or rather of inseparation, as in some of the *Cruciferæ* examined by Dr. Masters; while in the case of *Sedum*, *Solanum*, and *Spiræa* the peculiar arrangement of the bract seems to be owing to the third cause above mentioned.

Fauna and Flora of Eastbourne.—We have received a copy of the supplement to the Fauna and Flora of Eastbourne, by F. C. S. Roper, F.L.S., printed for private circulation. Both the supplement and the original work were undertaken by the chief members of the Natural History Society. The lists are numerous, and the work altogether well done. It is impossible to award too much praise to those who have been engaged upon it, and to whom it has evidently been a labour of love.

British Marine Algæ.—Mr. W. H. Grattann's work on the above subject has now reached the sixth part, including 133 illustrations. We regard this as the cheapest and most trustworthy yet offered to the public, and it is especially suited to the wants of young students of our British sea-weeds. The price of each part is only sixpence.

Eucalyptus globulus (Blue Gum-tree).—Some of the various notices which have appeared regarding this tree would lead to the supposition that its extraordinary sanitary properties are produced by exhalations from the flowers or leaves, which contain an astringent gum, and yield on distillation an essential oil. It is called a "disease-destroying plant," from its supposed emission of "antiseptic camphorous effluvia," and because it is found that, when planted in swamps, marshes, and other damp spots, it removes the malaria common in such pestiferous regions. It appears to me, however, that its effects may be attributed simply to drainage, by absorbing the moisture of the soil by its roots, and evaporation by the leaves, as stated by T. J. E. in Science-Gossip for March, who says he has had many years' experience in its cultivation, and refers to the "pumping power exerted by the far-spreading roots of this gigantic tree." The latter hypothesis would lead to the conclusion that the process is entirely mechanical, and that any other large trees, having roots as extensive, with similar powers of absorption and evaporation, and of a nature to thrive in swampy regions, would have the same effect. Certain plants are known to have a peculiar power of absorption and evaporation: florists find such to be the case, for instance, in the *Spiræa Japonica*, which on that account requires watering several times a day, or to be kept standing in water. Whatever may be the cause of its sanitary effects, the subject is interesting, and calls for further elucidation as to the characteristics of the tree and its medicinal properties.—*T. B. W.*

Flower-buds on Roots.—W. G. Piper asks if flowers are found on the root in other plants, as in the *Theobroma cacao?* The *Catananche lutea*, in all the numerous specimens I have met with in Algeria, has several flowers on the crown of the root, the others being at a distance at the top of the stem. The *Vicia amphicarpa* has the upper flowers and legumes above ground, the lower subterranean. I met with it at Montpellier, but do not remember whether the subterranean flowers had underground stems or grew direct from the root.—*T. B. W.*

Genista pilosa (Hairy Greenweed) as a Sea-side Shrub.—The latter end of February I saw a branch of this small shrub, which was sent from Poole, in Dorsetshire, where it grows spontaneously in great abundance close to the harbour: it was then commencing flowering, the flowers bright yellow and very abundant: it is a rare British evergreen, much branched and prostrate, and flowers from very early spring till the autumn. Sir William Hooker, in his "British Flora," gives only four localities, one of them being "near the Lizard and St. Agnes Head, Cornwall," where, as well as at Poole, it thrives close to the sea. Mr. Balchin, of the Cliftonville Nursery, is about to introduce it in Brighton, with any other seaside shrubs which the readers of Science-Gossip may bring to his notice. The *Genista pilosa* cannot fail to be attractive as a pretty evergreen border shrub, suited to the climate of Brighton, as well as for inland cultivation.—*T. B. W., Brighton.*

Bulbiferous Stem of Saxifraga granulata.—In reply to Mr. Piper's query in last month's Gossip, I beg to say that the bulbs occurring in the stem of the *Saxifraga granulata* are not of the nature of the bulbs mentioned by Bentley in his "Manual of Botany," as exclusively belonging to the class *Endogenæ;* those being bulbs proper, without reference to any other than such to which the following description will apply. "A thickened underground stem, covered with scales, emitting roots from its under surface, and producing a stem from its centre." Such, then, and only such as bear this definition, are true bulbs, of which the Onion and Squill are familiar examples. Every true bulb is, therefore, necessarily formed of imbricated scales, and a solid bulb has no existence. For instance, the *bulbi solidi*, as they have been called, though erroneously, of the Crocus and Colchicum, are a kind of subterranean stem, and which, though perhaps the nearest approach we have to the bulb, still are considered to be sufficiently distinct and marked from it, in consisting not of imbricated scales, but of a solid fleshy mass. Therefore I should say of the descriptions applied by Hooker and Bentham to the characteristic stem of the *Saxifraga granulata*, and which I find myself alike applied by other writers on botany to stems similarly characterized, that they are not intended by them to be applied in the above strictly botanical sense, but only in suchwise where the descriptions are based—and this is exactly how I take them to be—upon an external resemblance to, rather than to a partaking of the nature of, the true bulb; or, in other words, I regard them, in all such cases, as being adopted more upon the principle of suggestiveness than of strict botanical applicability. Again, and lastly, were they true bulbs, then there must, in such a case, be as many stems as bulbs, since, as we have seen, each is possessed of a stem-producing centre, which, in the so-called bulbiferous stem of the *Saxifraga granulata*, we know is not the case.—*John Harrison*, 41, *Wicker, Sheffield.*

GEOLOGY.

The Physical History of thr Rhine Valley.—At a meeting of the Geological Society of London, Professor Ramsay stated that his opinion was that during portions of the Miocene epoch the drainage through the great valley between the Schwarzwald and the Vosges ran from the Devonian hills north of Mainz into the area now occupied by the Miocene rocks of Switzerland. Then, after the physical disturbances which closed the Miocene epoch in these regions, the direction of the drainage was reversed, so that, after passing through the hill country between the Lake of Constance and Basle, the river flowed along an elevated plain formed of Miocene deposits, the remains of which still exist at the sides of the valley between Basle and Mainz. At the same time the Rhine flowed in a minor valley through the upland country formed of Devonian rocks, which now constitute the Taunus, the Hundsruck, and the highland lying towards Bonn, and by the ordinary erosive action of the great river the gorge was gradually formed and deepened to its present level. In proportion as the gorge deepened, the marly flat Miocene strata of the area between Mainz and Basle were also in great part worn away, leaving the existing plain, which presents a deceptive appearance of having once been occupied by a great lake.

Geology of Clevedon.—I am writing to you in hopes that some of the readers of Science-Gossip may be induced to turn a little attention to the geology of Clevedon, Somerset, which is certainly interesting, and the town and neighbourhood are very lovely, and would well repay a visit, though the place is comparatively little known. I feel interested in the question as to whether the Dolomitic conglomerate which flanks this coast and that of Portshead, resting on or abutting against the Carboniferous limestone, belongs to the lower Permian or upper Triassic system. It is a question which, I venture to think, might be more easily solved here than near Bristol, and I should like to have the opinion of some geologists who have examined the strata here, as it seems to me impossible to come to any other conclusion than that it belongs to the Permian system, and the Clevedon "Guide-book" calls it "Magnesian Conglomerate," on the authority of a geologist. The Magnesian limestone, which is quarried near the sea, for building, lies *above* the Conglomerate, the two gradually passing into each other; and in a new section I was examining the other day, lower down in the cliffs, a dull purplish marl is exposed, interstratified with thin layers of Conglomerate: surely this must be Permian marl? The Keuper marl of Redland, Bristol, is about equally hard, but of a brighter colour, and has not the blood-red tinge I sometimes see in the other. I have found imperfect fossils occasionally, principally of Magnesian limestone and Conglomerate, but they probably, from the situation of their strata, mostly belong to the Carboniferous limestone. The Conglomerate rock is sparkling, and often coloured green, as if from the presence of copper, and both it and the Magnesian limestone above it have drusy cavities containing transparent crystals. I do not think that the strata of which I am writing are marked *at all* in Saunders' "Maps of the Bristol Coal-field," which may be seen at the Bristol Museum. The Old Red sandstone is known to form the basement along the coast-line in this neighbourhood, the Conglomerate cliffs resting on it. Should any of your readers be able to throw light on the difficulty, I should feel very much obliged by their replying in Science-Gossip.—*K. L. G.*

Discovery of Foraminifera, &c., in the Boulder-Clays of Cheshire.—A paper on this subject has just been read before the London Geological Society, by W. Shone, jun. The author described the occurrence of *Foraminifera entomostraca*, and some other small organic bodies, in the boulder-clay at Newton by Chester, and at Dawpool. They were found partly in the interior of specimens of *Turritella terebra*, and partly free in the boulder-clay; but those obtained from the *Turritellæ* were in better condition than the others. The Foraminifera generally agree precisely with those found in the tidal parts of the river Dee. Mr. Shone stated further that the *Turritellæ* containing Foraminifera are filled with a fine greyish-white sand, in which the minute fossils abound, and he discussed the probable conditions under which the deposit containing them had been formed. Mr. Gwyn Jeffreys said that the Foraminifera sent by Mr. Shone are exactly the same as those found on the shores of England, Wales, and Scotland. The Foraminifera inhabit the edge of high water, and would naturally fill any shells that might be lying on the shore about that line. They might have been transported by ground-ice. Mr. Jeffreys remarked that we know comparatively little of the Arctic fauna at present, and that it was highly desirable that an expedition should be sent to investigate the marine fauna of high northern latitudes. Prof. T. Rupert Jones stated that the *Rotaliæ* are identical all round the coasts, those from different localities presenting different characters, as may be plainly seen in the *Rotalia Beccarii* of the Adriatic and of the English coasts. Various circumstances seem to act in changing the forms, especially whether the animals have inhabited deep or shallow water, or water more or less fresh. The *Globigerinæ* have thicker shells in deep than in shallow water. When ill-nourished, Foraminifera alter in the style of their outline.

NOTES AND QUERIES.

Molluscan Threads.—The recent interesting article in Science-Gossip upon "Molluscan Threads," induces me to add some little information that is new to the author of that paper, as well as unknown to most observers, I find. The author of "Molluscan Threads" states, at page 50, second column, "Slugs often *suspend* themselves by a thread, but do not use it as a means of *ascent*." That they can and do sometimes so use it the following will show, but that they are in the habit of doing so I cannot assert, though I believe it to be the fact that they do. I have frequently made the common *Limax arborum* suspend itself by putting a branch of ash with a small cross branch bent very slightly downwards into a flower-pot. I placed the slug upon this cross branch with its head towards the point. It immediately crawled to the point, over which it gradually slid, holding on by its tail, which at last became detached, and then the thread, which is merely a slimy secretion, is formed, and continues to be formed by the weight of the mollusc drawing it off the body. I believe the act to be entirely involuntary, for, from the time the slug reaches the end of the branch until its descent is finished, it is looking, as it were, for fresh footing, and it can keep its body not quite horizontal but oblique to the thread. If, when it has descended some distance, say eight or ten inches, the finger, moistened with a slightly saline solution—say saliva—is applied to it beneath, it deliberately turns itself up in a spiral form, and enclosing the thread in its mantle, reascends by a steady motion, the "slack" of the thread accumulating below the tail. If there is no projection of the edge of the branch to throw it off, it scarcely ever fails to land upon the branch and return the way it came. From the perfect ease and regularity with which all these slugs do this, I am inclined to think they are well accustomed to it, as I noticed they almost always did it if they did not find footing after descending a few inches; and from the manner also that they slipped off the end of the branch I am strongly of opinion that the whole process is involuntary. When they get to the end of the branch, I never saw one attempt to turn back, but it was while protruding over the end, and feeling about for fresh footing, that they slid off. The slug requires to be in a particular condition. Gorged with food, the slime is too thin, and the thread will not sustain them; but if kept over a night without food, they are sure to perform well next morning if the condition of the atmosphere is favourable—*i. e.*, warm and moist. I do not believe the thread is used as a means of voluntary descent, but that being frequently subjected to the mishap of slipping off, they have acquired the power of recovering themselves in this way, which they do so systematically as to leave no doubt about its being a voluntary action, enabling them to avoid descending into water, or anything injurious. I speak from numerous experiments, but probably the author of "Molluscan Threads" will be able to bring his experience to bear upon the subject. I brought this under the notice of the Dublin Natural History Society in 1863-4 (vol. iv. part ii.).—*William Harte, F.R.G.S.I.*

Marine Aquarium.—In reply to "J. G.," allow me to give a few hints for the construction and maintenance of a marine aquarium, gained from my own experience. My first attempt was with an ordinary propagating glass, 14-inch diameter, which I fixed in a stand. I first proceeded to put a layer of clean sand, which I covered with shingle, and procured some pebbles to which some seaweed was growing, taking care to reject the thick olive-green sorts, not only on account of their large size, but because I knew that they make the water slimy. Some of our common red seaweeds, finely branched, I chose in preference, and some of the larger grass-green seaweeds (*Enteromorpha intestinalis*), tufts of scarlet hair-wort (*Dasya coccinea*), and some few other common red weeds. Care should be taken to cleanse the weeds as much as possible without injuring them, before placing them in the vase, to remove all decayed or impure matter that may be attached to them, and so prevent, as far as possible, the water from being poisoned. It is well to allow the weed to remain a few days after planting before the introduction of any animals. A little rockwork is beneficial, for the enjoyment of the inhabitants of the aquarium. It may be made of pumice-stone cemented together with Portland cement. It should be built to come above the surface of the water, in order that such animals as the periwinkle, which need air, should be able to enjoy it; a few archways, nooks, and crannies should be made, among which fishes might glide, and afford shelter for such little creatures as do not court daylight or approve of prying eyes. I now come to stocking, which is perhaps the most difficult thing to do in London. I get my salt-water supplied me regularly from one of the fishing-boats that come up the Thames weekly to discharge their cargoes at Billingsgate, and have it conveyed home by Parcels' Delivery. The men on these boats will gladly bring up with them a stone jar or small cask of salt-water for a mere trifle—in fact, I got my entire stock from them, consisting of zoophytes, small fish, shrimps, &c. Care must be taken not to introduce inmates that are too large or too voracious, and thus overpower the others. The most lively and amusing inhabitants of the aquarium are the shrimps. They are continually on the move, using their feet and tails like paddles; they soon become tame, and will seize pieces of meat between their fore-legs, and eagerly devour it. The prawn is still more lively than the shrimp; but they must be small ones, or they will make sad havoc by attacking and killing other creatures. Among sea-anemones, none are better fitted for the vase than the daisy-anemone (*Actinia bellis*). Another beautiful kind is the gemmed anemone (*Actinia gemmacea*), and one which needs most care. Among the fishes suitable for the vase is the common plaice (*Platessa vulgaris*), which, of course, must be very small. The sticklebacks are rather too fond of fighting. A small sea-urchin or two (*Echinus sphærea*) will prove very interesting, especially when its movements are observed by the aid of a magnifying-glass.—*John H. Webb.*

Entomological Query.—The New Zealand correspondent of the *Times*, writing under date of January 10th, thus describes an insect which he states is "new to science." "It is a black wasp-like fly, but rather smaller than the English wasp. Its habitat, or perhaps I should more correctly say, its nursery, is a nest of clay built in some convenient crevice, and to the great annoyance of lady-housekeepers, the upper folds of heavy window curtains have apparently a peculiar charm for it. Having selected a suitable spot for its operations, it industriously carries tiny pellets of clay, which it moistens and plasters over the curtain or crevice, and on that foundation proceeds to erect a series of separate clay cells, from five to eight in number, the whole nest being from four inches to six inches in length, and about the size and shape of a man's little finger. The cells are not quite closed in, and the little builder sallies forth on a spider-catching expedition. Apparently the issue of the conflict is never doubtful, for about half a dozen of various size and kind are very speedily deposited captive and comatose in each cell. In each cell, too, is there laid a single egg, the young grub from which spends the days of his early infancy in consuming the spiders which parental or maternal care has provided for his sustenance, and which are undiminished in bulk and fulness a month or more from the time of their capture." I should be glad to know what insect is here described, or its probable genus.—*C. Lovekin.*

Bats in Spring.—I find, on p. 93, in vol. for 1873, a note from a correspondent, H. B. E. Fox, under the title of "Hybernation of Bats," wishing to know whether it is a common occurrence for bats to fly at midday in the spring of the year. I should like to know also, as I saw one on the 14th April, near Maryhill (12 a.m.), flying about in the sunshine. I watched it for about ten minutes, thinking it would take to a hiding-place; but it still continued to fly over the same ground.—*Alex. Macindoe.*

Old Trees and Squirrels.—In connection with old trees, it may not be uninteresting to your readers to know that on Saturday, Feb. 7th, some men felling timber in a wood near Cudham, Kent, cut down an old hollow oak-tree, when upwards of thirty squirrels rolled out, most of which were dormant or in a state of semi-sleep; but upon being roused, they dispersed to various parts of the copse. A large stock of nuts was stored away in the hollow of the tree, which had been collecected by these industrious little animals as a provision for the winter. It is common to find squirrels laid up in shelter during the winter, but it is seldom such a swarm is found together.—*Elizabeth Edwards.*

Saxifraga granulata (p. 94).—In answer to "W. G. P.'s" inquiry about the above plant, I beg to quote the following from Dresser's "Botany," page 28. "True bulbs appear to be found exclusively among Endogens; nevertheless, minute bodies analogous to bulbs occur in Exogens, which are called granules. *Ex.*: *S. granulata.*"—*R. B., jun.*

Insects' Eggs.—In answer to the query of H. Glazbrook in the March number of Science-Gossip, whether it is usual for *Thecla quercus* to lay its eggs on *Fraxinus excelsior*, when *Quercus pedunculata* is more plentiful in the same locality, I beg to state that I have observed the same myself, and also that in the second volume of the *Entomologist*, a gentleman writes that he saw several specimens of *T. quercus* gambolling and settling on an ash-tree near Beckenham, and also on the same day shook several out of a sapling ash at West Wickham. Some thirty or forty have also been seen gambolling about one lime-tree.

The Warm Season.—As a notable example of the extreme mildness of the season, I may record that I captured a specimen of the Brimstone butterfly (*Gonepteryx rhamni*) in flight on January 27th. This was a very warm day, the thermometer attaining a height of 53·8 degrees in the shade.—*W. F. Denning, F.R.M.S.*

Origin of "Lady-bird."—In reply to T. Palmer, the name "lady-bird" is said to be a corruption of "lady-bug" (lady, *i.e.* the Virgin Mary). In France it is still called "Bête de la Vierge," and in Germany, "Marienhäfer."—*R. H. M.*

Euplectella.—I do not think that the small crustaceans, &c., found inside the above-named sponge were placed there by the finder or preparer. Some uncleaned specimens sent over in spirit contain one or two specimens of small crabs, and in one of them is a shell of some species of pteropod. In one of the specimens a reticulated diaphragm has been formed about two inches from the bases: within this sponge a small crab is caged. This could not have been introduced by human agency. The occurrence of organisms in the Euplectella may, I think, be accounted for in another way; viz., by their swimming through the meshes of the sponge, and then being unable to find their way out, and in the course of a few days they would either have grown too large to do so, or probably have died from lack of nutriment.—*F. K.*

The Holly (*Ilex Aquifolium*).—I observe that this evergreen flowering shrub is not mentioned in the recent edition of Sowerby's "British Flora." I am surprised that a tree which seems to be the most interesting in the whole Flora should have been left out of such an exhaustive Botany as Sowerby's great work certainly is. What a crowd of associations surround this tree, which produces its fruit at the great feast of Christmas! Certainly, nobody needs a botanist to show the glossy leaves of the boughs and the bright red berries we are so familiar with at Christmas, decorating our churches and chapels, mansions, and the smallest cottages. No tree yields so much fruit as this. The skilful botanist, too, enjoys, with regard to this tree, the advantage of examining the blossom in February or March, and can examine the fruit without waiting for autumn. The Mistletoe, which accompanies the Holly, enjoys the same prestige as that tree. It resembles the holly in blossoming early in the year, when some berries may remain.—*S. A. Notcutt, jun.*

The Name of the Lady-bird.—Mr. T. Palmer inquires, on page 70, as to the origin of this title. I venture to suggest that the word "Lady-bird" is a relic of Catholic times, and that these beetles, like many of our native plants, derive their popular name from having been connected, by legend or otherwise, with the Virgin. It should be observed, that the term is by no means confined to any individual insect, but is applied indiscriminately to all the British representatives of the genus Coccinella. —*C. Lovekin.*

Gentiana verna.—The readers of Science-Gossip may be interested to hear that *Gentiana verna* blossomed, February 2, in my weedery, for the first time since it was brought three years ago from Teesdale Forest.

Slugs.—I should be thankful if any one could tell me of something to keep slugs away from *Leucojum æstivum*, *Gagea lutea*, and *Maianthemum bifolium*. I have grown them three years in my weedery, and each spring leaves and flower-buds have been completely devoured. I have tried soot, ashes, lime, salt, &c., but in vain; also I have planted crocus, snowdrops, and wild hyacinths to protect my pets; but no, the slugs will not touch them, and I am in despair. I catch them morning and evening literally by dozens, but their numbers do not seem to diminish.—*Mary Longhear.*

Lizards.—Having often kept the green Jersey lizard, and having one now in my possession, I can corroborate "H. F. M." as to its habit of licking its lips after taking a fly, as a cat does after her saucer of milk, and can add that it also uses its tongue in cat-like fashion when drinking, which it always does by lapping. It also reminds one strongly of a cat in its stealthy approach to its prey, and the wriggling movement of the body and tail which often precedes the final spring. These beautiful green lizards are quite an ornament to a fern-case, and are superior to most reptiles in intelligence and capability of being tamed. Mine, which I have had about three years, looks up for food, and will take a fly from the hand.—*G. Guyon.*

Welsh Seaside Shrubs.—Will any of your readers do me the favour to let me know what are the best shrubs and trees to plant on an exposed and windy part of Anglesey, near Holyhead? The young plants will be at first protected by stone walls.—*Edmund H. Verney.*

Molluscan Threads (Sc.-Gos., p. 49).—Often when a mollusk (pulmonobranch) is ascending by a thread, it returns before reaching the surface of the water: its method of reversing the attachment of its thread is by curling its body until the extremities meet, when the thread is transferred from the tail to the head.—*G. S. T.*

NOTICES TO CORRESPONDENTS.

H. J. McG.—Your plants are,—No. 1, *Erodium cicutarium*; No. 2, *Spergula arvensis*.

O. Bates.—The shrub from near Abergele is *Garrya elliptica*.—*J. F. R.*

A. C.—Your plant, called the "Snowdrop-tree," is doubtless *Symphoria racemosa*, or "St. Peter's wort," a native of North America. A good elementary book on Botany is that of Professor Oliver, or Masters's "Botany for Beginners."—*J. F. R.*

J. Platt.—Your fossils obtained from the gravel-pit were not vegetable, but animal. Both are fossil corals, of carboniferous age, both of them *Lithostrotion*.

J. L.—Get Wood's "Insects at Home." It not only contains figures of the various insects you name, but gives popular and trustworthy accounts of them.

G. W. B.—The diatomaceous deposit described by Ehrenberg as *Bermuda tripoli* was long supposed to have come from the Bermuda Islands. Mr. G. Norman, of Hull, found that it came from New Nottingham, U. S., near which is a township or hundred called Bermuda. Professor Bailey seems to have sent Ehrenberg a sample, labelled *Bermuda tripoli*. It was probably sold as a polishing powder under that name, just as one of the Irish subpeat deposits was locally known as "Lord Roden's Plate-powder." I fear the New Nottingham deposit cannot be purchased here, but I have no doubt that some American microscopist would be able to supply a small quantity of it.—*F. K.*

Fossil Teeth.—Fig. 57, in last number of Science-Gossip, was printed upside down. We simply mention this that the mistake may not mislead any student.

W. K. G.—You will find a good deal of information respecting the Old Red Sandstone fossils of Scotland in Ray Lankester's monograph on Devonian Fishes, published by the Palæontographical Society; in Hugh Miller's "Old Red Sandstone," "Footprints of the Creator," &c.; and figures of fossils in Devonian strata elsewhere, in Murchison's "Siluria," Geikie and Jukes's "Geology," Taylor's "Geological Stories," &c.

T. E. Mason.—Your letter has been forwarded. You would find no difficulty in procuring diatomaceous material through our Exchange column, if you have anything to offer for it.

H. W. Kruse, of 2, Portland-place, Southtown, Great Yarmouth, kindly offers to assist any of the Science-Gossip marine aquarium-keepers in obtaining salt water, if the latter are willing to pay the cost of transmission.

H. T. G.—Your plant is *Veronica Buxbaumii*.

H. O.—Whitaker's "Geology of the London Basin," which forms one of the volumes published by Government, under the direction of the Geological Survey, will give you all the information you seek relative to the depths of the deeper wells in and about London, and the strata through which they are sunk.

P. S. E.—You will find the differences (which are very great) between the *Hydrozoa* and the *Polyzoa* in any good manual of zoology.

J. Lumsden.—Your mosses are,—3, *Dicranella cerviculata*; 4, *Hypnum purum*; 5, *Sphagnum cuspidatum*. No. 2, the supposed "Coralline," is a seaweed, called *Corallina officinalis*.

E. W.—Your mosses are,—1, *Funaria hygrometrica*; 2, *Dicranella varia*.—*R. B.*

E. V. Pike.—Kirby & Spence's "Entomology" is published by Longmans & Co., at about 5s. For a beginner, Newman's "British Moths" and "British Butterflies," would be much better. The price is not very great.

J. Dutton.—Stark's "History of British Mosses," published by Lovell Reeve & Co., would be the best book you could obtain. The price is, we believe, 10s. 6d.

E. Thomas.—It is not at all a rare matter for the Peacock butterfly to be seen on fine days in February, inasmuch as it hybernates during the winter, and is warmed into life by the returning heat of the sun.

S. A. Brenan.—*Phallus esculentus* is identical with *Morchella esculenta*. See Cooke's "Handbook of British Fungi," fig. 656.

J. C. Muir.—We are sorry to say your specimens of *Isoetes hystrix* never reached us.

R. Taylor, referring to Tate's "Manual of British Molluscs," which gives the habitat of *Planorbis lineatus* as "near London," wants to know the exact locality. Will some one help him to it?

Henry Gould.—Your specimen is not a clustercup, but so nearly resembles *Æcidium* that it was formerly called *Uredo æcidiiformis*. It is now known as *Trichobasis petroselini*. The plant on which you have found it is the *Smyrnium olusatrum*.—*M. C. C.*

J. G.—You will find a good direction of how to cut sections of coal in page 87 of Science-Gossip, volume for 1872, and a further account, by Mr. E. T. Newton, on page 19, volume for 1873.

C. C. Underwood.—Your micro-fungus on leaf of Date-palm is *Graphiola phœnicis*, figured in Cooke's "Handbook of British Fungi," fig. 221.

E. L.—The snail shell is that of the "Apple snail" (*Helix pomatia*), our largest species. The mineral is carbonste of lime (*calcite*), deposited as stalactite.

EXCHANGES.

Pterocera Bentleyi, &c., for other fossils.—H. Gould, 6, Ironmonger-street, Stamford.

Reindeer Moss from Labrador, and Liber of White Birch. Dagger-plant, and Lace-bark tree, for Shells, for a little girl's collection.—Mrs. Reid, Bridport, Dorset.

Collema biatorinum, *Sticta aurata*, *Faunaria nebulosa*, &c., offered for other Lichens.—Send list to R. V. T., Tregawn, Withiel, Bodmin.

Wanted, a Geologist's Pickhammer. State what required. —W. G., 3, Gordon-street, Nairn, N.B.

Wanted, a few Larvæ of Crane-fly (*Tipula*), and ditto Cockchafer (*Melolontha vulgaris*). A good return will be made in Microscopic Objects, mounted or unmounted.—Address to Jas. Lumsden, 197, Dorning-street, Wigan.

American Sea-weeds for British or Australian ditto.—Address, F. W. Hall, 14, Park-street, New Haven, Ct., United States.

Puccinia buxi.—Send stamped envelopes and objects of interest to C. P., Innox Cottage, Corscombe, Dorchester.

Melitæa Cinxia, *Arge Galathea*, *Lycæna Adonis*, and others, for Lepidoptera, British Plants, or Birds' Eggs.—Send list to W. Jordan, Cockfield, Sudbury, Suffolk.

Twenty-nine Monthly parts of "Cassell's Book of Birds," for the "Illustrated Natural History of British Butterflies," by Newman, or anything useful to an entomologist.—H. Sims, Howard-street, Wakefield.

I should be glad to exchange Flowering Plants, Ferns, Mosses, Lichens, &c., during the coming summer, with any of the readers of Science-Gossip.—F. W. Hall, 14, Park-street, New Haven, Ct., United States.

Send stamped envelope and object for Sections of Horn, Hoof, and Cuttlebone, to Thomas Lisle, Moorfields, Wolverhampton.

Well-mounted Foraminifera from Pacific, 1,400 fathoms, for good Diatom or other Slides and material.—H. B. Thomas, Boston, Lincolnshire.

Eggs of Blackheaded Bunting, Barn Owl, Sand Martin, Sedge Warbler, Whinchat, and others, in exchange for other British Eggs.—Address, John Platt, Shavington, Nantwich, Cheshire.

Shells Wanted: *Valvata cristata*, *Planorbis carinatus*, *P. lacustris*, *Zonites nitidus*, and *Anodon cygneus*, varieties. Offered: *Unio margaritifera* (English), *Clausilia dubia*, *C. nigricans*, *Helix sericea*, *Pupa pygmæa*, and *Succinea putris*, var. *intermedia*.—W. F. Sutton, Gosforth Grove, near Newcastle-upon-Tyne.

Microscopic Slides in exchange for others.—Send lists to John C. Hutcheson, 8, Lansdowne-crescent, Glasgow.

BOOKS RECEIVED.

"The Ice Age." By James Geikie, F.G.S. London: Ibister & Co.

"British Hepaticæ." By Dr. Carrington. Part I. London: Hardwicke.

Timbs's "Year Book of Facts for 1874."

"Smithsonian Report" for 1872.

"Grevillea." April.

"Land and Water." April.

"Journal of Applied Science." April.

"Canadian Entomologist." March.

"Popular Science Review." April.

"Monthly Microscopical Journal." April.

"Boston Journal of Chemistry." April.

"Transactions of the Manchester Geological Society."

Communications Received up to the 12th ult. from:—Dr. C. C. B.—C. B.—J. E. W.—W. H. W.—E. V. P.—J. T. S.—A. S. J. A. D.—M. L. W.—F. S.—E. A. B.—H. E. W.—J. L.—E. F. S.—L. S.—G. W. B.—J. B.—W. W. S.—G. A. D.—S. A. B.—G. G.—H. M. M.—W. E. H.—O. A.—E. T.—C. W.—E. H. V.—A. C.—J. B.—T. McG.—W. G.—S. I.—W. H. G.—T. B. W.—H. T. G.—B. T. L.—L. R.—J. G. B.—C. L.—F. M. P.—T. E. M.—H. J. McG.—W. J. C.—E. H.—R. V. T.—H. W. K.—W. K. G.—W. R. H.—J. L.—H. G.—C. F. W. T. W.—E. L.—E. P. P.—J. S. R.—B. G. L.—E. L. R.—M. J. U.—F. J. A.—H. B. T.—J. C. H.—H. M. W—J. P.—L. G.—W. F. S.—J. F. R.—W. B. F.—T. L.—W. J. S. S.—C. M. M.—S. J. Mc. I.—E. T. N.—W. P.—E. D. M.—A. T., &c.

A CANTERBURY ARACHNID, NEW TO THE BRITISH FAUNA.

As the continental engravings of *Argus reflexus* are not very satisfactory, and I believe that no figures from British specimens have ever been published, I hope those which I have now made will be interesting to the readers of Science-Gossip, and indeed to English arachnologists generally. For details of the histological anatomy, the observations of the Messrs. Gulliver should be consulted in the Reports of the East Kent Natural History Society, of which abstracts appear in the *Quarterly Journal of Microscopical Science*, April, July, and October, 1872. Therein, among other points, are described the curious oblong red corpuscles in the intestinal cæca; the beautiful globules of guanine in the urinary tubules, with a comparison of these bodies in *Argus* and *Ixodes;* the spermatozoa of the last genus; comparative measurement of the eggs of both these genera; and the composition of the dermal dots in *Argus*. This curious and uncommon Arachnid was first introduced to the notice of the East Kent Natural History Society on March 27th, 1871, specimens of which were given to me by one of the vergers in Canterbury Cathedral, and was reported as peculiar to that building and as not having been seen elsewhere. The Honorary Secretary, G. Gulliver, F.R.S., made a cursory examination of them at the time, and at once saw that as they had each eight legs, and the head joined to or consolidated with the thorax, they were not insects, but belonged to the Spider class (*Arachnida*). On his taking them home for further investigation, he failed to identify them with any specific description in the systematic books then at his command, and could make out nothing more about them, but they seemed to belong to the division Acarina. He therefore sent specimens to an entomological authority in London, who failed to make them out, but pronounced them, in his opinion, to be a sort of sheep-tick. But this was far from

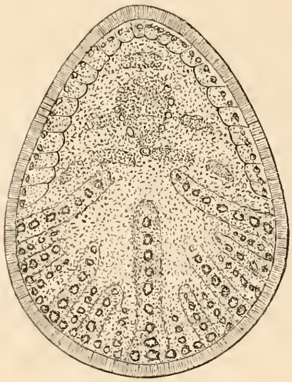


Fig. 82. Dorsal view of *Argus reflexus*.

being satisfactory; whereupon Mr. G. Gulliver, jun., B.A., took some specimens with him to Oxford, and submitted them to Professor Westwood for his investigation; and this eminent entomologist was the first to declare them to be the *Argus reflexus* of Latreille, who states that it occurs free in houses in France.

Two specimens that I found on the wall of the passage that leads from the Cathedral to the Library, April 20th, 1872, I placed in a glass-topped box, in which they lived for one year and ten months. On June 27th, 1872, I found they had laid a large number of eggs, which were quite round and of a reddish-brown colour, smooth and very bright, having the appearance of small glass beads: the mean diameter of the egg is 1–34th of an inch.

August 5th, 1872.—I observed that a number of the eggs were hatched, and in a short time the whole of them were hatched out and briskly running about the box; all of them having only six legs each, the old ones having eight. The young lived for more than six months, but on what they, with the

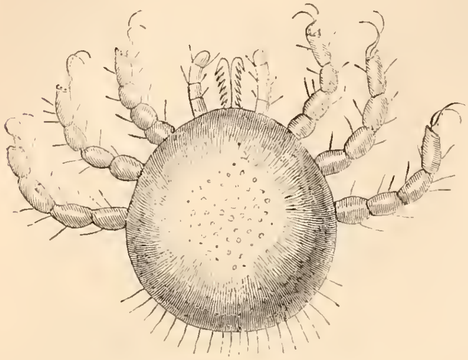


Fig. 83. Young of *Argus reflexus*.

Fig. 84. Nat. size of ditto.

old ones, subsisted, is more than I can tell, as there was nothing in the box with them but a few small pieces of decayed wood. I watched them continually, expecting to see the addition of the deficient pair of legs, which I thought probably would take place at a moulting; but, not being in a natural condition for their further development, this did not take place. They are stated by Latreille to be parasitic in their early state on young pigeons, but this we have not yet been able to verify. Some of them are about a third of an inch long, a fifth broad, and a twentieth thick, but many are smaller. The

Fig. 85. Nat. size of *Argus reflexus*.

back is irregularly wrinkled or pitted, and in the larger specimens, regularly studded with minute points, each about 1-120th of an inch in diameter, and composed, according to Mr. Gulliver, of carbonate of lime. The outline of the creature is egg-shaped, with the small end forward. They have no eyes, nor have they a suctorial proboscis, like the common tick. They are quite opaque, and throughout of a dull and uniform dark brown hue, except at the circumference, which is rather paler: they are slow in their movements, and when disturbed will readily sham death by drawing up the legs close under the body, so as to be completely hid from sight on a dorsal view (fig. 82). Since the fire that took place September 3rd, 1872, by which a portion of the old roof of the Cathedral was destroyed, very few specimens of the *Argus* have been seen, and it was supposed that the creatures inhabited the old timber of the roof, where for ages both pigeons and jackdaws have nested, and that the few that have at times been found in the lower parts of the Cathedral were casual wanderers from their usual haunts. But Mr. H. Austin, the present architect of the Cathedral, thinks they have nothing to do with pigeons as parasites, nor with the old timber as food. He relates that some twenty-five years ago, his father (who was then architect), in having some

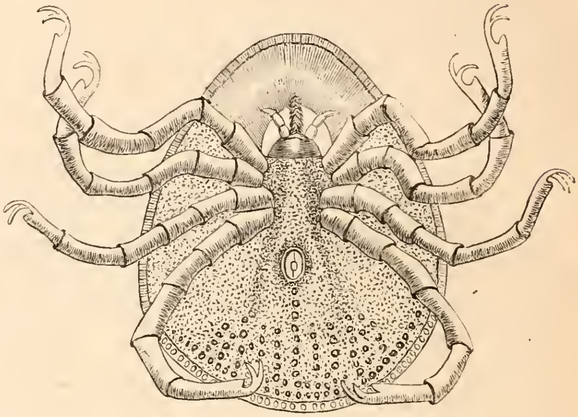


Fig. 86. Ventral view of *Argus reflexus*.

old wall removed in connection with the repairing going on in the Cathedral, came upon a quantity of these insects in the mortar in which the stones were laid. He had them placed in a box with the intention of sending them to London for investigation. They were put by at the time and ultimately forgotten. Some four or five years had passed, when the box containing them was found and opened, and to his astonishment numbers of them were still living. There was nothing in the box in shape of food, nor was there any indication that they had consumed any portion of the box. Annexed is a sketch (fig. 85) I have made from the specimens I have by me. Perhaps some of your many readers may recognize them as inhabiting some other places as well as Canterbury Cathedral, and be able to throw some light on their life-history.

May 1st, 1874.—I have just obtained two specimens of the *Argus*, near to where I found those before mentioned; they were almost covered with that salty semitransparent efflorescence that is frequently found on the mortar of old buildings.

JAMES FULLAGAR.

"The present is only the last of a great series of pre-existing creations, of which we cannot estimate the number or limit in times past."—*Lyell's "Geology."*

THE HISTORY OF CULTIVATED VEGETABLES.

By H. G. Glasspoole.

No. II.—The Onion.

"Wel loved he garlic, onions and letics."
Chaucer.

The various kinds of onions, garlic, and leeks, are called alliaceous plants, and were formerly placed by the older botanists under the natural order of the Asphodeliceæ, but are now included in the Liliaceæ, or Lily tribe. The native country of the garden onion (*Allium Cepa*) is not known. Dr. Kitto, in his "Cyclopædia of Biblical Literature," thinks that some region of Persia may have first produced it in its wild state, as many species of the Allium are to be found in the moutainous chain which extends from the Caspian to Cashmere, and likewise in the Himalayan mountains. There is a tradition in the East that when Satan stepped out of the Garden of Eden after the Fall of Man, onions sprang up from the spot where he placed his right foot, and garlic from that which his left foot touched. Be this as it may, there is no doubt of its great antiquity, since there is evidence to show that this bulb was known and esteemed in Egypt 2,000 years before the birth of Christ, for Herodotus informs us that in his time there was an inscription on the Great Pyramid stating that a sum amounting to 1,600 talents for this vegetable which had been consumed by the workmen during the progress of its erection. One of the complaints that the Israelites made to Moses in the wilderness was that of being deprived of the onions, leeks, and garlic of Egypt.

It has been said by some authors that the onion was worshipped as a god by the Egyptians, and Pliny, in his "Natural History," writes thus on the subject:—"Where, by the way, I cannot overpass the foolish superstition of the Egyptians, who used to swear by garlic and onions, calling them to witness in taking their oaths, as if they were no less than some god." Juvenal in like manner ridicules the Egyptians for their superstitious veneration of the onion (Sat. xv. 9).

"'Tis mortal sin an onion to devour;
Each clove of garlic is a sacred power:
Religious nations sure, and blest abodes,
Where ev'ry orchard is o'errun with gods."

Dr. Kitto remarks that this must be an exaggerated statement, as it is unlikely that the Israelites should have been allowed to regale themselves upon what was considered too sacred for, or forbidden to, their task-masters. It is probable, as suggested by Dr. Harris, that the priests only refrained from what was freely partaken of by the people. This may be observed in the present day among the Brahmins of India. It has also been supposed that some particular kind of onion may have been held sacred from its utility as a medicine, as the sea onion or squill (*Scilla maritima*), which grows in great abundance on the seacoast in the neighbourhood of Pelusium, whose inhabitants are said by Lucian to have especially worshipped the onion. But it is evident that the Israelites in the desert did not long for this acid bulb.

The onion was well known to the Greeks and Romans. It is said that Pythagoras, the great philosopher and traveller, who lived in the sixth century B.C., wrote a treatise on the onion. Theophrastus, who died in his 107th year, complaining of the shortness of life, wrote on the same subject about 200 years before the Christian era. Pliny mentions all the countries from whence the Greeks and Romans procured the different varieties of onion, but states that he could not discover that they ever grew wild. The different kinds were named from the places which produced them, and among these the Cnidian onion was considered the mildest, and those from Cyprus drew the most tears.

Perhaps from Italy it may have been distributed throughout Europe, in almost every country of which it has been cultivated from time immemorial. We have no record when the onion was introduced into this country; it may have been brought by the Romans, or introduced at a later period from the Continent by the monks. The earliest mention of them that I can find are in the lines at the head of this paper from Chaucer's Prologue (v. 636), who lived about 1340, in the reign of Edward III. Gerard, 1597, writes thus on the subject:—"The onion being eaten, yea though it be boiled, causeth headach, hurteth the eies and maketh a man dimsighted, dulleth the senses and provoketh overmuch sleep, especially being eaten rawe." He adds, "Being rawe they nourish not at all, and but a little though they be boiled." In Donne's "Hort. Cantabrigiensis" it is stated that the Spanish onion was brought into this country about 1596.

In a curious old poem, entitled "The Hog hath Lost his Pearl," published in 1614, occur the following lines:—

"And you that delight in trulls and minions,
Come buy my four ropes of hard St. Thomas's onions."

"Buy my rope of onions, white St. Thomas's onions," was one of the cries of London in the seventeenth century. (See *Notes and Queries*, vol. iii. series i.)

Shakespeare notices their property of drawing tears in "Taming of the Shrew," which play is supposed to have been published about 1625, where he says:—

"If the boy have not a woman's gift
To rain a shower of commanded tears,
An onion will do well."

We learn from Bradley, who wrote in 1718, how much this pungent vegetable was then esteemed. After having stated that the potato was thought a root of little note, he says: "I now come to treat of the onion, a root more generally used in the kitchen than any other. Of this there are two kinds worth the gardener's care. The first is the Spanish onion, which affords a large, sweet-tasted root, and the other the Strasburg onion, which is more biting, and lasts good much longer than the former."

Sir Francis Bacon, in the fifth century of his "Natural History," declares that "onions wax greater if they be taken out of the earth, and laid a-drying twenty days, and then set again; and yet more if the outermost peel be taken off all over." He was of opinion that their growth was influenced by the state of the moon. "Take," he says, "some seeds or roots of onions, and set some of them immediately after the change, and others of the same kind immediately after the full: let them be as like as can be, the earth also the same as near as may be, and then see how they differ." He adds: "For the increase of moisture the opinion received is, that seeds will grow soonest, and hedges and herbs cut will grow soonest if they be set or cut in the increase of the moon."

The medicinal qualities of the onion have been the subject of disputes with physicians, both in ancient and modern times.

Asclepiades, a physician of Bithynia, who wrote about ninety years before the Christian era, and all his followers, affirmed that onions were wholesome, caused strength, and cleared the complexion. Pliny states that, in his day, the medical fraternity held a different opinion, and considered that they were hurtful to the parts about the heart and other vital members, that they hindered digestion, &c.; still he admits that they have some good qualities, for he says: "Those onions which are sown in gardens I am sure will, with their smell only, cause the eyes to shed tears, and by that means clarify the sight; but if they be anointed with the juice, they will mundify the better."

In warm climates the onion grows to a large size, and is milder and more succulent than those of our country. In the south of France, Spain, and Portugal, it is often eaten like an apple, with a piece of bread, by the labouring classes for their dinner.

In Egypt, as of old, it is still greatly esteemed. The traveller Hasselquist remarks on the exquisite flavour of the Egyptian onion, and says "that it is no wonder the Israelites should have regretted the loss of this delicacy, for whoever has tasted of the onions of Egypt must acknowledge that none can be better in any part of the universe. There," says he, "they are mild and pleasant to the palate; in other countries they are strong and nauseous. There they are soft and yielding, but in the countries to the north they are hard, and their coats so compact as to render them less easy of digestion." The Egyptians divide them into four parts, and eat them roasted together with pieces of meat, which preparation they consider so delicious that they devoutly wish it may form one of the viands of Paradise. A soup made of these onions was pronounced by the learned traveller to be certainly one of the best dishes of which he ever partook. This savoury bulb is known and esteemed in the countries beyond the Nile. Major Denham states that on his route south from Bornou, he saw numerous gardens, but the only vegetables produced in them appeared to be onions and beans.

The many culinary purposes to which this vegetable is applied are known to every one, and it has been stated that the onion and mushroom make the foundation of every sauce both in ancient and modern times. It constitutes one of the luxuries of the poor, and finds its way in various forms to the tables of the wealthy; indeed, as Dean Swift says:—

> "This is every cook's opinion,
> No savoury dish without an onion."

And, according to the witty Sydney Smith, no salad would be perfect without them, for in his poetic recipe for making one, which he wrote some years ago at Castle Howard, the following lines occur:—

> "Let onion atoms lurk within the bowl,
> And scarce suspected animate the whole."

Next to the potato, perhaps the consumption of onions among the poor and labouring classes of this kingdom is greater than any other vegetable.

In that amusing and interesting work "London Labour and London Poor," it is stated that £99,900 are being annually devoted to the purchase of this article by the poor, and that from eight hundred to one thousand persons are engaged in this trade in the great metropolis.

The onion is still sold about the streets of London as of old, in ropes made of straw, into which the roots are firmly plaited, principally by the Irish poor. There are several varieties of the onion in cultivation; the Strasburg, Spanish, and Portuguese are most esteemed. Some are of a milder flavour than others, but it has been observed, the further north this vegetable is grown the stronger the flavour becomes.

The imports of onions are very considerable; in 1867 they amounted to 845,214 bushels.

How to aerate Aquaria.—I shall be glad if any of your readers who are skilled in the management of aquaria can tell me the best means of effectually aërating a marine aquarium containing 1,500 gallons of water.—*E. A. Butler.*

A RARE ZOOPHYTE.

THREE or four years ago I made an excursion to one of our bays, and brought home from a rock-pool a handful of *Phyllophora rubens*, for the purpose of examining the small zoophytes with which it was encrusted. I had much delight in seeing the pretty little auimals of *Lepralia ciliata* and *L. Gattyæ* (the latter was new to me) expand their delicate tentacula in a watch-glass full of sea-water, aud on one small frond of the *Phyllpphora*, the quaint and curious little *Beania mirabilis!* It was described as growing ou stems and shells, and I would never have thought of looking for it on a seaweed. It expanded itself fiuely at first, but the weather was dull, and it died before I could see much of it. As I saw by Johuson's aud Londsborough's books that the animal was unknown, I was anxious to procure auother specimen, so I visited the same tide-pool somc time ago, but neither *P. rubens* nor *Beania* wcre there. I examined *Phyllophora* from other localities without success, but at last, when I did not think of anything but specimens of seaweed, I saw, on the perpendicular side of a rock, at low-water mark, somc small circular fronds, probably *Kallymenia reniformis.* On one of these fronds I found, but too late to take it alive, the latter variety which I sought. On Friday, the 17th of April, the tide being propitious, I went to the same spot and brought away a quantity of encrusted weeds from the rocks, at the lowest tide, and after carefully examining every portion with a lens, I had the satisfaction to find *one* frond of the *Kallymenia* (it is less than an inch in size), which was inhabited by a colony of *Beania* in company with other scarcely less interesting atoms.

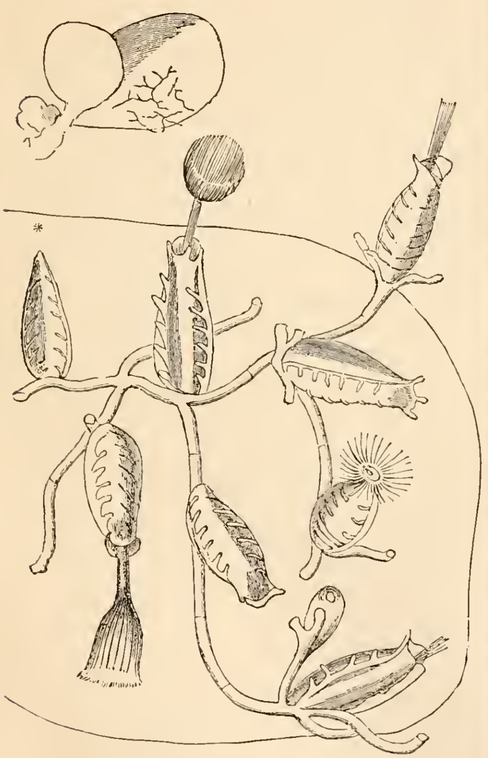


Fig. 87. Rare Zoophyte (*Beania mirabilis*).

I had some difficulty in examining it, as it would not expand itself in the glass trough of the microscope, but in a watch-glass it came out of its cell freely, though it kept itself obstinately shut up if the suu shoue too brightly upon it. I send the accompanying sketch, as it will be bctter than any description which I could give in words. It is a lovely little creature, as transparent as glass. The polype-cell opens like the mouth of a travelling-bag or a porte-monnaie, and then the animal protrudes its whole length, then expauds itself like a beautiful crystal cup on a long stem, turning itself in every direction with the most charming grace.

There are cells in every stage of growth, from mere tubes to full-grown; some of these, such as the one marked thus *, I did not see expand, and I take them to be cells in which the auimal is not yct quite developed. L. R.

A FIREMAN'S DOG.

MY friend Mr. Tozer, iu his interesting article on the origin of fires, did well to qualify the discredit he endeavoured to throw upon the dog in relation to such catastrophes, by admittiug that many auecdotes might be rclated of the interest dogs have taken in, and assistance they have given at, fires. The following, though perhaps not known to Mr. Tozer himself, will be familiar to many members of his brigade, and speaks volumes for the sagacity of the one animal which, above all others, makes itself so companionable to man.

At one of the principal Manchester theatres, adopting the recommendation of Mr. Tozer, the proprietors, upon the theory tbat preventiou is better than cure, engaged a person as night watchman, whose duties were to make the tour of the building during the performances, again immediately upon the close of the entertainments, and finally in the early morning. To guard against the common and great evil, arising from the system of night-watching—sleep—periodical visits were made from the fire office. Left alone in a spacious building, and that one associated with anything but excitement, the long hours of solitariness and enforced wakefulness must have passed wearily iudeed. No wouder, theu, that the man should have accepted the companionship of a wretched-looking stray cur, who was only too glad to avail himself of the shelter afforded him, and of the morsel of food he thus obtained. By-and-by this dog ("Jack," I think, it was called) became attached to the place, and regularly went the rounds with the watchman, sniffing at every corner and diving into all manner of crevices where dangerous material was at all likely to accumulate, and, its work finished, lying at the feet of its self-chosen master. This nightly routine continued for some time, "Jack" being as regularly at his post as the watchman—perhaps even more punctual. At length a new arrangement of night-watching was made. The services of the watchman were dispensed with, Mr. Tozer undertaking to provide one of his brigade for the purpose. Everybody thought the last had been seen of "Jack;" but not so. "Jack" persisted in continuing his self-imposed duties. He did not, however, become so attached to the fireman as he had been to his friend the watchman, but he never missed going the rounds, generally alone. The one during the performance he did not miss for years, as he could obtain admission so easily at the time the building was, as it were, open to the public. And it was no uncommon thing to meet "Jack" either crossing the back of the stage on the way to the dressing-rooms, in the "flies," or in the carpenter's shop, tail between legs and nose close to the floor, regardless of all efforts to distract his attention. As soon as his business was done away he would go. But one luckless night "Jack," in endeavouring to cross the stage, took the wrong "opening," and, to the astonishment of possibly none more that himself, made "his first appearance before the public." Nothing could well have been more *mal à propos* to "Jack," for, as ill-luck would have it, the manager himself was playing that night, and, still worse, was on the scene at the time. A crowded audience were listening with "'bated breath" to the play, when ugly "Jack" suddenly became the "observed of all observers," and changed entirely the humour of the house, which broke out into an outburst of laughter, in which the heroine, who was supposed to be overawed by the declamation of the hero, joined most heartily. The manager-actor having his back turned, did not see the cause of the absurd turn the simulated tragedy had taken, and waxed wroth. His vengeance had to be wreaked, and upon "Jack" was visited the summary punishment of total and final expulsion from within the walls of the theatre. But notwithstanding the edict, and the faithfulness with which the hall-keeper endeavoured to carry it out, "Jack" now and again managed to elude the guard and made his round. Gradually, however, finding himself so unwelcome, he ceased his visits entirely.

B. PEACOCK.

SUBTERRANEAN ENTOMOLOGY.

I HAVE lately made an excursion in the department of the Ariége; my principal object being the collection of the eyeless beetles which inhabit the numerous grottos in this part of the Pyrenees, already well known for its underground fauna, and I have thought a short notice of the excursion may be of interest. I must premise that my visit was made in autumn, a season but little favourable to the purpose.

In the latter days of August and the first fortnight of September I was staying at Aulus-les-Bains, near which is a solitary grotto, close to a spring known as the Neuf-Fonts. There I discovered, after a two hours' search, some specimens of a new *Adelops*, which I named in reference to the locality, *Ad. novem-fontium.* It lives near the end of the cave, under small rolled pebbles, which form here a thick bed.

In the same spot I deposited morsels of raw meat by way of bait, and very soon succeeded in capturing numerous individuals of this species, which I should probably have failed in securing had I contented myself with the ordinary method of collecting. The meat also attracted several *Pristonychus Pyrenæus;* and on one of my last visits I found at the extreme end of the cave an eyed *Macharites* (sub-genus *Linderia*) buried in the half-liquid mud.

From the 15th to the 19th September I remained at Saint Girons, from whence I made several visits to the grottos of Aubert and De Moulis, which afforded me *Anophthalmus Pluto* and *cerberus* (the former common enough in the De Moulis grotto) and *Orpheus*, which lives on the summit of the slope by which the descent is made into the grotto of Aubert, by a path not only light, but exposed to the direct rays of the sun. All the specimens I found of this species were buried deep in the soil, which at that season was scarcely damp. I searched in vain for *An. Bucephalus*, of which a single example had been captured in the Aubert cave by M. Dieck.

Of *Adelops* I took *clavatus* in abundance in both caves, and also, in lesser numbers, the large and handsome *Dieckii*, which appears to be confined to the Aubert cave, where it lives by preference in the Great Hall, at the opening of one of the two galleries by which the visitor enters.

In the cave of Olot, about a quarter of an hour's walk from St. Girons, I found eight examples of an *Adelops* crawling over the walls, which, strange to say, were not *Abeillei*, so common in that locality, but the *Stygius* of Dieck. Near the entrance, on the heaps of bats' dung, were numbers of the *cyanescens* variety of *Pristonychus terricola.* This beetle was my sole capture in the cave of Miguet.

From the 20th to the 26th September, I transferred my centre of operations to Prat; where Pierre Manaud, of Cazavet, the regular entomologists' guide, conducted me to all the grottos of the neighbourhood. I strongly commend Manaud to future explorers, as I am confident they will be satisfied with his services.

The cavern of Peyort, which has hitherto afforded only *Anophthalmus cerberus*, and that but sparingly, was the one in which I made the most interesting captures. At the extreme end I met with a form of *An. Orpheus* intermediate in aspect and size between the true *Orpheus* (such as it appears at the entrance of the Aubert Cave) and *consorranus*, as found in the grotto of Aspet. My discovery confirms the suggestion of M. Dieck, that the latter is simply a variety of *Orpheus*, in opposition to M. Abeille's opinion, who would raise it to the rank of a species.

It is worthy of remark that the *Orpheus* of Peyort buried in semi-fluid clay at the extremity of an absolutely dark cave, is nevertheless as brightly coloured as individuals of the same species which revel in the direct rays of the sun at the entrance of the grotto of Aubert!

Anophthalmus cerberus abounded in the same locality, running over the mud, and with it I took four specimens of a new *Anophthalmus* (*An. teresias*, mihi), belonging to the *Aphænops* group; but sufficiently distinguished by the size of the head and the more robust form.

The grotto of Estellas, the special locality of *An. cerberus*, gave me that species in abundance. I found besides thirty examples of *Adelops infernus*, and a solitary female of a species which I took to be *Ad. Ehlersi*, originally discovered in the grotto of Saleich. This last-named cave afforded me four *An. cerberus*, a few *Ad. infernus* and *ovatus*, but not a single *Ehlersi*.

In the grotto of Aspet, seventeen or eighteen miles from Prat, I found three individuals of *An. Orpheus*, var. *consorranus*, buried in the slope near the entrance; but the finding cost me several hours' work with the pickaxe.

I also picked up four specimens of *Ad. lapidicola* under the stones scattered over the floor, and a large supply of *Ad. ovatus*, a species which abounds in this cavern, especially beneath the stones, resting upon heaps of what appears to be old decomposed guano of bats.

Returning to Saint Girons on the 26th September, I remained there four days for the purpose of making excursions to Mas d'Azil and Sainte Croix. In the former I found *Adelops Abeillei* in considerable quantities, but no *Anophthalmus trophonius*, as I had expected. I employed the rest of the day in visiting the huge cavern of the Mas on the left bank of that stream. The cavity is not very deep, but has a wide opening; nor is it absolutley dark in any part. At the time of my visit it had become a little dry: in spite of this I captured in a short time several specimens of *Pholenon Querilhaci*, a few *Adelops Abeillei*, a single *Anophthalmus cerberus*, var. *inæqualis*, and two individuals of a new *Adelops*, to which I gave the name of *Ad. crassicornis*.

On the 1st of October I went from Saint Girons to Massat. Near Massat, on the side of a hill named Le Gueire or Le Ker, two spacious caverns open out one above the other. In the upper one I took a few examples of *Adelops Discontignyi*, and another species which answers to the description of *Ad. zophosinus*, but which I dare not affirm to be that insect before comparing it with the type, as it has not hitherto been found in the caverns of Massat.

The lower cave is the dwelling-place of bats; never have I seen so large a number of these disgusting creatures collected in one place. The floor, the walls,—in fact, the whole cavern—is covered with their excreta, the heaps of which are infested by myriads of dipterous larvæ, and in some cases swarming with *acari* to such an extent, that the ground is completely hidden from view. Hundreds of *Pristonychus pyrenæus* crawl over the piles of guano, and fatten on the easily-captured prey, which this countless population offers them. They are in turn tormented by the mites (*acari*), which attach themselves to their bodies in great numbers; and it is, perhaps, to escape from these pests that they are so constantly seen creeping along the walls of the cavern. Here they appear to live on good terms with the numerous spiders which spread their webs on every side.

The next day I went from Massat to Ussat, passing by Bédeillac, where there are several caves worth visiting. In one of them, remarkable for its dimensions and the richness of its stalactites and stalagmites, I found several specimens of *Ad. pyrenæus*. Leaving Ussat on the 3rd, I visited the famous grotto of Lombrive. or Echelles, the largest and perhaps most beautiful in the Pyrenees, and well known to entomologists as the home of the rare *Anoph. Minos*. It has, however, been sought for in vain for some time now. I was not more fortunate than my predecessors, and was obliged to be contented with some specimens of *Pholenon Querilhaci* and *Ad. pyrenæus*.

Two days after this I reached Lavelanef, where I was told there was a cave. My informant, however, forgot to tell me that the floor of the cave was entirely occupied by a deep stream, which supplies the public fountain in the neighbouring town. I persevered, nevertheless, waded through the ice-cold water up to my middle, and was rewarded for my boldness by the capture of a dozen specimens of an entirely new *Adelops* (*Ad. Perieri*, mihi), which were crawling over the sides of the grotto.

De la Brûlerie, in *Petites Nouvelles Entomologiques de* 1872–73.

PLANTS OF THE GREAT ORME'S HEAD.

MR. T. M. WEBB, who has written about the rare plants of Anglesea (in S.-G., No. 100, p. 40), inquires as to whether the local *Linosyris vulgaris* or *Chrysocoma Linosyris* still exists on the Great Orme's Head, and intimates that his botanical friends cannot *now* find it. Perhaps they did not know where to look, for the Orme's Head occupies a considerable area, and yet one particular ledge of rocks is more productive of rare plants than any other. I was at Llandudno in September last year, and found some fine specimens of the *Linosyris* in flower, on the same range of limestone cliffs on which the *Cotoneaster* used formerly to grow in considerable plenty. I was at the time groping among the recesses of the broken ledge alluded to, wanting to see if any of the *Cotoneaster* was left there; but after three close searches at the locality where, twenty years ago, a considerable quantity of the plant was apparent, and in fruit too, specimens of which I then gathered, I could now find *only one* little stunted shrub, scarcely visible in the crevice where it grew, which I scrupulously left in its position; and unless this remains safe from the rapacious hands of the unsparing collectors that, unfortunately for the *Cotoneaster*, have visited Llandudno since its rise into celebrity as a watering-place, I fear that it will have to be "judiciously bracketed," as Mr. Webb says, with other lost habitats of rare British plants. The inquiries and demands of lady botanists have, I am afraid, led to the extermination of the *Cotoneaster;* for, as attached particularly to the Orme's Head, it has got placed as a rarity into the Guide Book of Llandudno, and rocks and woods are stript of their ferns to be sold to visitors in a living state. In Dr. Hooker's "Student's Flora of the British Islands," it is questioned whether the *Linosyris* is a native of Britain; but, growing on such a locality as the Orme's Head, I can see no reason myself to doubt it. A report from particular localities as to the "now" existence of plants at the spot is always satisfactory, as preventing dissapointment to searchers.

On the same ledge of rocks I allude to, I observed *Orobanche hederæ, Thalictrum minus, Geranium sanguineum*, and abundance of *Veronica spicata*, var. *hybrida*, which the Welsh have appropriated to their prince Llewelyn, under the name of LLLYS LLEWELYN, which may be worth notice, as I think nothing has been yet done as to recording the common names of plants given by the Welsh. This particular ledge of rocks, the special seat of the *Cotoneaster*, does not face the sea, but its aspect and position are shown in a woodcut in my "Botanical Looker-out."

The same side of the Orme's Head is productive of other local plants, as *Potentilla verna, Scabiosa columbaria, Helianthemum canum*, and *Juniperus communis*. The latter clings to the rocks in a prostrate state; but when I first visited this remarkable headland, there was evidence that the Juniper had in past times grown erect and of considerable size, for old decaying stems lay on the ground in several places.

Spiræa filipendula is particularly plentiful on the turf of the hill, but in a dwarf state, as indeed are most of the other plants scattered about this calcareous ground. As grand masses of building now front the beach, with a crowd of bathing-machines, all the littoral plants that I knew there in years past are swept away, and among the rest *Senecio viscosus*, which in my former visits was plentiful; but I found that it had taken refuge in a waste rubbishy spot above one of the paths now leading among houses to the southern side of the Head. I may also mention that the grey or small-flowered Thistle (*Carduus tenuiflorus*), that when I first knew Llandudno, was in enormous abundance about the place, has now entirely disappeared, for I did not meet with a single specimen. The Yellow Horned Poppy (*Glaucium luteum*) had also been banished, though I detected a colony of it in a curious spot some distance from the shore, amidst the débris of a quarry towards Conway. The increase of population and building speculations in places where Nature previously reigned in solitude, causes great alteration in the stations of plants, and is perplexing and annoying to the botanist.

Between Llandudno and Conway there is a little cluster of igneous hills, which may be compared to large round puddings suddenly taken from the pot, and one of these, more conspicuous than the rest, and near to the river Conway, bears the name of Craig Diganwy. At the top it has a range of precipitous rocks towards the river, and it was fortified by the early Welsh princes; fragmentary relics of whose walls and towers yet remain hard as the rock itself. When I first clambered up the Craig, many years ago, I was struck with the appearance of its vegetation, which, being on a trappoid soil, was quite a contrast to the plants on the Orme's Head. The Foxglove (*Digitalis purpurea*) here revelled in profusion, while there was not a single specimen on the Orme's Head, and the rocks here were sprinkled over with the Nottingham Catchfly (*Silene nutans*); and one very pretty adornment to the ground was the Maiden Pink (*Dianthus deltoides*). I need not mention other plants that grew here, but it was quite a botanic garden, delightful to contemplate. But since my last visit what an horrific change has occurred to desecrate the spot. Some miserable cheese-paring Welshman has inclosed and taken possession of the space on the top of the Craig, formerly occupied by the keep or donjon of the old castle, and which is sunk a yard deeper than the rest of the area, and planted it with potatoes. How long it has been thus appropriated I cannot say, but the footsteps of the Taffies have brought with them a mass of almost every kind of noxious or ugly weed, that is sure to encumber cultivated land and its borders. Nettles (both *Urtica dioica* and *urens*) of course abounded; thistles in masses difficult to get through; trailing brambles, forming a thorny labyrinth vexatious to pierce; enormous quantities of the Black Horehound, and other weeds of detestable aspect it is not worth while to enumerate. One thing was perhaps worthy of notice, that the sides of the obstructed path up the hill were bordered at intervals with numerous seedling plants of the Milk-thistle (*Silybum Marianum*), which I never before saw in such abundance. There was little else worth notice on Craig Diganwy at this time, except an extraordinary growth of Sea Barley (*Hordeum maritimum*), on the very top of the hill, and on a rock by the side of the potato-garden, a tuft of the Orpine (*Sedum telephium*), which I only mention to remark that the Welsh in their common name for it have commemorated the famous magician and bard Taliesin, calling it *Llysiau Taliesin*. I was glad to recover the pretty *Dianthus deltoides* on the hill adjacent to Craig Diganwy, and then, as the sun descended over the sea, I passed on to Conway.

EDWIN LEES, F.L.S.

Green Hill Summit, Worcester.

NOTES FROM NEW ZEALAND.

ON looking over some back numbers of SCIENCE-GOSSIP, 1872, my attention was attracted by a drawing of Plumatella, and I determined to search our lakes for some of the family. I was the more induced to do so, by a statement in the *Popular Science Review* for 1863, to the effect that not till 1860 had any representative of the family been discovered in the southern hemisphere. Not having been in the habit of looking for such things, it was perhaps a month before my search was rewarded with success. I had turned up stones, dragged up roots, but could find only a small specimen, with a circular disc of tentacles, which I will notice presently. At last, sitting on the edge of the lake, I saw in the shallow water at my feet a small black mass, apparently covered with white pearly-looking dots. My curiosity being excited, the unknown was soon transferred to a bottle, supplied with water, and allowed to rest quietly for a few minutes, to get ready for my pocket-lens. It was not long before some hundreds of little Polypides pushed forth their horseshoe-shaped lophophores and commenced to feed away as if they had never been disturbed. I brought them home and kept them for some weeks, in order to be able to examine their statoblasts, which are very like those of *fruticosa*.

These were plentiful, but no ova could I find, and, strange to relate, the reverse was the case with the circular-crowned specimens. The latter were kept for more than three months, but no statoblasts ever appeared. Ova were often ejected, which after spinning about merrily for twenty-four hours would settle down quietly on the side of the glass and begin to found a new colony. Their settling on the side of the glass gave me a fine opportunity for observing them closely. Placing it on a stand before the lamp, I was able to direct the microscope horizontally at them, and as the young ones were almost transparent, the whole internal economy was distinctly visible. The minute cilia with their alternate vibration, the diagonal retractor muscle, and the continuous movement of the food in the alimentary canal were to me, who saw them for the first time, objects of great interest.

An amusing circumstance occurred with these circular-crowned Polypides. Sometimes a little water-flea would thoughtlessly venture within range of the tentacles, which instantly closed in on it, forming a kind of spherical cage, out of which the poor little flea frantically endeavoured to escape, but in vain. At length the little prisoner rested from his futile attempts to gain his freedom, and, all being still, the tentacles once more spread out as usual.

No sooner did the little prisoner see this than he darted for the opening, only to find himself stopped again by the suddenly closed tentacles of his more active captor. Seven or eight times did this take place ere he regained his liberty. It was a good picture on a small scale of a cat playing with a mouse; with this difference, pussy when tired generally feasts on her plaything, while the little Daphnia is in no danger of being injured by the polyped.

From its being so admirably adapted to supply the wants of amateurs, SCIENCE-GOSSIP no doubt finds its way into many an English household, some members of which may perhaps be thinking of coming to these far-off lands. I would earnestly advise such, if already lovers of nature, to bring with them a microscope and one of the numerous excellent works that are published about it. Not only is there no other instrument from which so much amusement and instruction can be derived, but there is nothing like the study of nature for imparting to both young and old the habit of correct observation and clear thinking. My advice to them is: do not give up any hobby you may have in the old country, but look forward to prosecuting it more vigorously in the new; for our woods and lakes are teeming with life, much of which probably differs from that at home. Still, many old friends will be met with, such as the curious Volvox, the industrious Builder Animalcule, the lovely green Desmids, some of which might furnish a design for a "Fenian Star of Merit," and hosts of others that are figured in home publications.

Wanganui, New Zealand. C. HULKE.

TURNTABLES AND CEMENTS.

IN the diagram of turntable, fig. 64, p. 81, there is an inaccuracy which, as there represented, would render it perfectly useless. The "cam" F should form a portion of a spiral with a gradually increasing diameter, so as to act, in fact, like a circular wedge, the piece of mainspring, which has been softened at one end and turned into a loop, fitting loosely on to the screw A, serving to keep the slide from being moved endwise by the friction in turning, as it would do were the slide and the cam in direct contact. The accompanying figure is from a tracing of the original, and therefore gives the exact size and form. If the cell be a little more on one side of the centre of the glass slip than the other, the narrower side of the glass should be placed uppermost, as this requires less space than the other to be moved through in adjusting.

From observations recently made, there is reason to believe it is not an uncommon plan to mark the centre of the glass slip and then to turn it over and mount the object on the under side opposite to it. Such a proceeding will, of course, invert the relative position of the central spot with the edges of the glass, and throw it out of centre when placed object upwards on the turntable; and from an examination of many slides in my own collection, there is full evidence of this having been the course adopted. In centring, the upper surface must contain the object as well as the first stage in the marking. If, for instance, intending to use a half-inch cover, make a circle five-eighths or three-quarters of an inch in diameter, and when dry place the object in the centre of this circle, and the latter will be a correct guide for the cover, which may very readily be adjusted with its edge equidistant within the ring, the latter disappearing on clearing off the balsam. Before using, the glass slip is best cleaned with spirits of wine and a piece of fine cambric, after which it only requires particles of dust to be brushed off immediately before placing the object upon it.

Cements may be divided, practically, into two classes,—one for the making of, or fixing down, cells, the other for attaching covers and for the subsequent filling up the edges, either for security or for ornamentation. For the present we will confine ourselves to such cements as are to be used with the turntable. For shallow cells, either for fluid or for dry objects, there is scarcely anything to equal the original "black japan"; objects mounted in which nearly twenty years ago are as perfect as at first. The circle should be made as full and plump with the japan as possible, with a full brush, and then it should be placed in a slow oven (or in a Dutch oven before the fire), until baked too hard to be indented with the thumb-nail. It will now be found shelving off to each side of the ring, forming a wedge-like edge to the inside of the cell, which is very objectionable, as objects are apt to get between it and the cover; therefore it must be turned off to an abrupt ring, which can be done as easily on the turntable as in a turning-lathe. The three holes in the turntable under the left-hand end of the glass slide, represented in fig. 88, admit of a small conical pin being dropped in, so as to set the slide fast in the only remaining direction it could move. A piece of wood projects over the surface of the wheel and up to within an inch of the centre, to act as a rest for the finger, and then with a small sharp chisel the hardened japan may be scraped off the glass and turned into shape in a few moments. A quantity of these cells of all diameters should be kept ready for use, as they require some time in hardening.

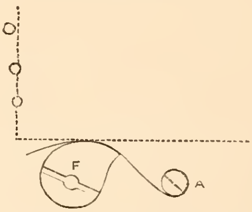


Fig. 88. Portion of a Turntable.

The material next in usefulness is termed asphalte, or asphaltum, a kind of mineral pitch brought from Trinidad. It is soluble in various fluids, but some of these solutions have the objectionable quality of "running in," and whenever any oil, varnish, or japan gold-size, &c., is mixed with it to reduce its brittleness, this tendency is greatly increased. In its pure form it has none of this tendency whatever, and the solvent which enables it to retain the most of its original character is "benzole"; but there is this disadvantage, that if made thin enough to work freely it spreads on the glass, and if thick enough to prevent this, the benzole evaporates so fast that it becomes unworkable and rubs up into lumps. The desideratum has been to find some means of making it workable and yet devoid of the running-in propensity, and a suggestion made by Mr. Ackland bids fair to accomplish this to its fullest extent. The addition of a somewhat gelatinous matter causes it to flow evenly from the brush, and to stand up well and form a ring of considerable substance, which is ready for use in a few minutes, without any risk of its spreading or running in. When perfected, it is probable it may be had of Mr. Ackland at so trifling a cost as to render it not worth any one's while to trouble himself with the "messing" and uncertainty attending the making of it in small quantities.

When a cell of greater depth is required than can be built up of cement, other substances then come into requisition. One of my earliest and best form of cells was made of metal rings fixed to the glass by the baked japan. A ring of japan was formed and, while wet, the ring was dropped into it, properly centred, and then put aside for baking. In this way cells of any dimensions may be securely fastened to the glass, provided the latter be perfectly free from greasiness.

The black japan for baking is an article specially prepared for the purpose, and must not be confounded with Brunswick black or any other of the black varnishes that dry quickly by mere exposure to the air, as these contain too little body to withstand the baking, becoming charred and spoiled by the heat, and there is little doubt that much disappointment has often arisen from the want of this knowledge, and not having the proper article. A very superior black japan is obtainable at Sherborn's, 321, Oxford-street (a few doors south-west of the Circus): a half-pint tin can be had for about a shilling, which has been found to answer thoroughly.

In the same way the new asphalte, minus the baking, may be used for putting down almost every description of cell, as it is very adhesive, and, if rightly proportioned, is only just one remove from being brittle. It should be allowed to become "tacky," and the cell then dropped upon it and slightly pressed down into its place. I use pieces of plate-glass about one inch square and a quarter of an inch thick to serve as weights, and to keep the cells flat and down upon the glass slide until the cement has become sufficiently set to retain them without assistance.

Of whatever material, however, the cells may be composed, it is an essential point not to use any fixing-down cement that will remain indentable by the nail, or can afterwards soften and run in by being varnished exteriorly, nor must it be capable of setting too hard, so as to become brittle and flake off from the glass; but under any circumstances, all compositions containing gold-size ought to be scrupulously rejected as being untrustworthy and insecure for this purpose, or, where such may have been used, they ought invariably and at once to be coated exteriorly with some harder varnish, such as shellac in spirit of wine, gum arabic, or the isinglass cement. The majority of the bought slides which prove defective may become so through two sources, that is, either from insecurely fastening down the cell, so that it does not retain its adhesion to the glass slide, which may arise from shrinkage of the cement, or its becoming too brittle to withstand the jarring of use or transit; or it may arise from the same evil attending the fixing on of the cover, a point which will be the next to receive consideration.

W. KENCELY BRIDGMAN.

LADYBIRDS.

AT p. 70 a correspondent asks the meaning o the word "ladybird." It is an abbreviation of "Our Lady's bird" or bug, as it is sometimes written; bug in this instance being synonymous with beetle, as it is to this day in the United States, where the term bug almost invariably takes the place of beetle. Many a time, when in the States, I have heard that word, so distasteful to us, used in common conversation by refined ladies or gentlemen, who would not for the world have uttered a syllable likely to "offend ears polite." "Oh, what a lovely bug you have there," has been said to me when exhibiting some fresh-caught, prettily-marked beetle. So that, in our country term "lady-bug" and the more slangy "humbug," we have the last faint echo of a word which still holds its own on the other side of the Atlantic.

Curiously enough the poetical sentiment which placed the Ladybird under the protection of the Blessed Virgin may be traced in other tongues besides our own. Thus in France these little insects are known as Bêtes de la Vierge, Bêtes à Dieu, Vaches à Dieu. In Germany they are Marien Käfer, Marien Würmchen, Gottes Schäfflein, Hergott's Kühlein; or Mary's beetles, Mary's wormlings, God's lambs, the Lord God's little cows,* &c.

Ladybirds, as is well known, are great enemies to the destructive plant-lice; but whether their dedication indicates a corresponding degree of gratitude on the part of the original namers, I know not. Probably this is so. Country folk, with all their crass ignorance, are often shrewd watchers of nature's works; and though they find it difficult, or more generally impossible, to communicate the results of their observations, they can "put two and two together" with marked effect in their own minds.

I have little doubt then, that "ladybird," "God's cow," "Mary's beetle," are but the expression of a fact observed time out of mind by the peasantry of Europe, that these beetles are indefatigable destroyers of the mischievous little aphids or plant-lice, which, minute though they are, would, if un-

* They are also Lady "cows" in some of our counties. Why is this? I suppose from the fact of their often herding together, and from their colour approximating that of a red cow: hence also the French *Vaches*. The "Schäfflein" is probably due to the first of these two reasons.

checked, mar the fruits of man's labour to an incredible extent. That this is no exaggeration we know from the anxiety displayed by owners of hop-grounds, lest all their care should be thrown away and their hopes disappointed by the soft little atoms, which sometimes crowd upon the tender "bine," extracting its juices and wasting its vigour. Then it is that "Our Lady's bird" shows itself to be a friend in need. Urged by a sense, of the nature of which we have not the smallest conception, but which we call instinct for want of a better title—myriads of red-coated beetles assemble on the infected ground. Here they wage unceasing war against the soft-bodied aphids, killing and devouring like wolves in a sheepfold, and then disappearing as mysteriously as they came.

No doubt in days when every event which eluded the immediate researches of mankind, was ascribed to the direct agency either of the Deity or of Satan, according to its apparent tendency to good or evil, the frequent recurrence of such natural phenomena led the peasantry to give their peculiar titles to the Ladybird, as though it acted on an impulse derived immediately from Heaven. And this is the more probable, as the influence of the aphides would be acutely felt by the thirsty natives, involving, as it did, the possible loss of their beer, in the case of the hops; though in all probability the names were given long before the hop-flower was used in the manufacture of beer.

Itchen Abbas. W. W. SPICER.

GASTRIC TEETH *VERSUS* ELYTRA-CLASPERS OF EARWIG

(*Forficula auricularia*).

HAVING recently exchanged several slides with the readers of SCIENCE-GOSSIP of what myself and others at that time considered to be

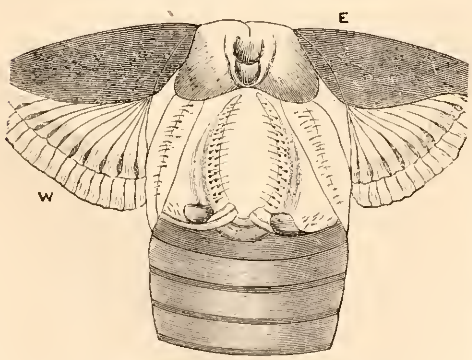


Fig. 89. Wing and Elytra-clasps of Earwig (*Forficula auricularia*).

the gastric teeth of the common earwig, I have since—after a more careful examination and dissection of this insect (at the suggestion of a microscopical friend)—made out these miscalled teeth to be the wing and elytra-claspers for retaining these organs when in repose. These prehensile organs are situated in two parallel rows

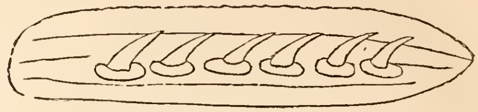


Fig. 90. Six of the Claspers highly magnified.

under the elytra, as shown in the diagram, studded with numerous minute sharp spines, resembling in form those of the upper jaw of the pike (*Esox lucius*) termed "dentes setiformes." There is also a similar row of claspers situated on the under surface of each elytron, near the inner margin.

I am anxious that this error of misnomer should be rectified in the pages of your journal, considering a mistake of this nature passed unnoticed might have a tendency to mislead others interested in insect anatomy, trusting those to whom the slides were sent will pardon the blunder, remembering that "Humanum est errare."

J. O. HARPER.

Dereham-road, Norwich.

THE AMERICAN OTTER.

(*Lutra canadensis*, Sab.)

BY CHARLES C. ABBOTT, M.D.

SLOPING, muddy banks; dark, deep water, that looks the gloomier for the dense shade cast by the giant elms and maples overhanging it; tangled stems of snow-white water-lilies, and broad patches of feathery river-weed, scarcely relieving the sombre tints of their surroundings; weird, ghost-like slimy trunks of fallen trees, slippery with the green scum of a score of summers, or glassed by the clear jelly of the Pectinatella, floating in the tideless stream like spirits of unrest; solemn-visaged, quiet-loving owls, that seem to live only that they may dream, haunting the dense foliage of the lofty cedars; and now and then "the chatter of a jay, that echo murmurs after"—what a charm has such a place for him who loves not mankind less, but nature more! Happy to escape the din and dust, the clash and clamour of the smoky town, and to seek out just such nooks as this, that, thanks to whomsoever thanks are due, has not succumbed to the ingenuity of the engineer, or been stripped to prosy nakedness by the greedy agriculturist. On such a spot I chanced during the past summer, and while marking the faint ripples on the quiet waters, was startled by a loud splash near by, that started glassy circles out and out, until they broke upon the tangled roots and weedy margin of the other shore. It was an otter that I had heard. Fortunately, I had escaped notice, and remaining very quiet, soon saw him, as he slowly emerged from the water, with a large fish held grimly in his mouth. With seemingly awkward steps he crawled up the sloping bank, and in a marvellously short time devoured the fish that he had captured; then walking to a point near by, where the bank was free of projecting tree-roots, he squatted down on his haunches, but held his head aloft, and with a ludicrous expression of extreme satisfaction slowly slid down the smooth bank and disappeared beneath the surface of the water. I waited a long time, but saw nothing more of him.

It need scarcely be remarked that in New Jersey the Otter is nearly extinct; but not so in many sections of our enormous territory. Professor Baird gives as its range the "northern parts of the United States to Florida, and west to the Rocky Mountains." An extensive range this, but of course, as localities, however suited to its tastes become encroached upon by the steady "settling up" of the country, it is forced to seek out "fresh scenes and pastures new," where it will be found frequenting running streams, large ponds, and occasionally away from water, as though in search of better things than the last creek or brook-side offered. It prefers clear waters, that it may *see* the fish therein more readily, and has a burrow in the bank, which opens below the surface of the water; but if not swimming about the stream, it seems to like to be *above* rather than *in* the ground, and to quietly sleep and sun itself on a mat of grass; but never so soundly that it can be caught napping, either by the wary fur-hunter or less careful intruders. That the Otter is as strictly nocturnal as asserted by some, does not accord with the few opportunities I have had of observing his habits.

An experienced hunter* gives an excellent *résumé* of the Otter's habits, as follows: "They live on fish and musk-rat. They dive down, and then rise into the passage-way of the musk-rat house, so as to push their jaws into the house and catch the musk-rat, unless, as is sometimes the case, the musk-rat has a second passage to escape through. The Otter has no house, but lives in holes in the banks of streams, and in hollow logs, and under roots. He dives and chases fish under water; I saw one do this, and then shot him. He seems to like to slide instead of walking down a slope. He seems to have certain places for voiding his excrement."

Audubon† describes the nest as formed of "sticks, grasses, and leaves; large, and in all cases protected from the rains, and above and beyond the influence of high water and freshets."

Fig. 91 The American Otter (*Lutra canadensis*, Sab.).

With our annual "January thaw," and its accompanying freshet (this year delayed until February), came to us a recollection of the lone otter we had seen in the summer; and so through the soft snow and over thin ice we wended our way to the quiet nook on Watson's Creek, to see if he yet lingered about the spot. We found recent traces of him, but not the animal himself; and wondering if he had left of his own accord, or been captured by musk-rat hunters, we wandered down the creek

* "American Naturalist," vol. i. p. 656.

† "Quadrupeds of North America," Audubon and Bachman, vol. ii. p. 7.

to its mouth, to watch the broad Delaware as it bore its enormous mass of snow and ice slowly along. At the mouth of the creek the ice was almost gone, and in the open space sported great rosy-sided chub, that seemed to rejoice at the near approach of spring. While I watched them, up from the blue depths of the icy water came the otter, with a still struggling chub across his jaws. I endeavoured to conceal myself, but not quickly enough, for the otter disappeared, but not for ever, as soon, at some distance farther off, he came again to the surface, and clambered on a cake of ice as it drifted slowly outward, "to join the brimming river."

I sought to drive him from his perch by shouts and snowballs, but in vain; aud with an air of indifference at my presence, he merely watched me, so I thought, as he slowly floated seaward on his trembling raft of ice.

Trenton, New Jersey, U.S.A.

MICROSCOPY.

To Prevent "Running-in."—When mounting in fluid, especially glycerine, a friend of mine uses chloroform and amber varnish for the first and second coats after putting on the thin glass cover, and finds it to answer admirably in preventing the succeeding rings of asphalte, &c., from running in. My experience of it also enables me thoroughly to recommend it, as it contains no solid particles, and dries as soon as laid on. It is sold by dealers in photographic chemicals. For the like purpose in dry mounting I have used, at the suggestion of the same friend, flake-white and gum-water, and I think "F. K." would find this mixture to work smoother, and give a purer white than whiting and gum-water.—*W. R. H.*

Infusoria. — Mr. W. Saville Kent, F.L.S., F.R.M.S., &c., being engaged upon a new treatise on the Infusoria, to be shortly published, invites communications from the Fellows of the Royal, Quekett, or other microscopical societies, and microscopists generally, upon any new and doubtful forms of infusorial life that may come under their notice. A record of phenomena not generally known in association with previously-described varieties will be of value, as also local lists of species. Address, Wentworth House, Stoke Newington, London, N. Postal expenses of specimens defrayed.

Siliceous Cuticles of Equisetaceæ, &c.—In the new edition of Davies's "Preparation and Mounting of Microscopic Objects," he directs that the stems of plants with siliceous cuticles should be immersed in strong nitric acid aud boiled. I have succeeded better with a slightly diluted acid (three of acid to one of water) and a few crystals of chlorate of potash. Boil in a porcelain or platinum capsule; as soon as the organic material is separated, transfer the cuticle (by means of a strip of thin glass two inches in length; about half an inch of this should be bent at right angles) to a watch-glass filled with distilled water; when free from acid, the inner surface may be brushed with a camel-hair pencil. This will remove any fibres that may still adhere to the epiderm. When clean, immerse in absolute alcohol, and transfer from thence to oil of clover or turpentine, and finally mount in Canada balsam. The leaves of the Deutzias are also readily detached by the same process: when detached and washed, they must be floated on to a cover (the outer surface next to the glass); brush very gently, and when dry, immerse the cover in turpentine until all the air is expelled, which when effected, mount in Canada balsam (which may be previously hardened on a slide). The plan suggested (scraping off the scales) in the work alluded to does not make satisfactory slides.—*F. K.*

Addresses of Provincial Natural History Societies.—On this subject no one is likely to be more interested, or to have better means of information, than the editor of Science-Gossip. At present, numberless clubs or other provincial societies exist that are ignorant even of the names or whereabouts of their kindred associations, although such knowledge is often required by one or other of them, if for no other purpose than the transmission of little presents or the interchange of Reports of Proceedings. Hence it has become very desirable that a correct list, with the names of the secretaries, honorary or otherwise, of such local societies should be published; and by doing this, including the microscopic clubs, Science-Gossip, or any of its numerous readers, might confer a most acceptable service to the cause of local and popular natural history. — *George Gulliver.*

ZOOLOGY.

Extraordinary Luminosity of the Sea.—Every one who has sailed over the placid waters on a dark night has seen that bright shining appearance known as phosphorescence, seen best, however, in its golden splendour in the many quiet harbours of eastern lands, where living diamonds appear to drip from your plashing oars. In our own waters this appearance is principally due to noctilucæ, annelids, crustaceans, or star-fish, and is generally occasioned by some disturbing element entering amongst them as they skim over the surface. In the early part of February, in the Arabian Sea, and about twelve hundred miles to the westward of Bombay, steaming quietly along in one of those huge floating barracks which convey our troops to and from India, we witnessed a luminosity of the sea to such a degree as is, I believe, excessively rare. The whole ocean around us had a milky or chylous appearance, and was studded with innumerable brightly phosphorescent bodies, varying in their apparent size from one or two inches to as many feet in diameter, displaying, as Dallas describes, "balls of living fire and waving bands of flame." Here and there were single opaque masses,—black, shapeless, and contrasting strongly with the brilliant light in which they floated,—which I attributed to dead animals of the same species. It was a clear, starlight night, the moon was late in rising, hardly a ripple was on the water, the atmosphere dry, and thermometer 78° Fahr. On looking over the ship's side, the scene was one of surpassing interest and extraordinary beauty, and had never been witnessed before by hundreds on board, who were no strangers to eastern seas, nor yet to the precise locality in which we then were. Unlike the phosphorescence of noctiluca, the light was not emitted in sparks, but was steady and continuous, nor was it occasioned by the disturbance of the ship, as the phenomenon was seen both far ahead of us and at a distance on either side, which could not have been influenced by the ship's track; indeed, there was a well-defined and distant horizon to which the luminosity extended. In about two hours after the luminous appearance was first observed, the moon rose, and the sea again assumed its natural appearance, but only to resume its brilliancy on four successive nights as we neared Bombay, having in that time crossed a belt of upwards of eight hundred miles teeming with animal life. On repeated examination of the water, the temperature was found not increased beyond the normal standard in relation to the air, but after standing for a short time it gave out a strong phosphoric odour, which clung to the hands for a considerable time. The luminosity was found to emanate,—1st, from large pulmograde acalephs, probably of the genus *pelagia*, studded throughout their substance by dark brown ova about the size of a millet-seed; 2nd, from myriads of polypoid bodies in every stage of development, from minute ciliated discs resembling infusory animalcules to the large tentacled budding polype. Doubtless, the whole had a common origin, and here, for hundreds of square miles, in the great Indian Ocean, had we "parthogenesis" on the most gigantic scale. Whether such appearances as I have detailed be due to "combustion," to "rupture of sarcodic filaments," "permanent contraction of sarcodic substance," or the numerous other supposed causes of phosphorescence, I know not. I had but few books to consult, and no naturalist companion to explain, but of the many who must have traversed this "white sea" (as we called it) during the past few months, I trust there may be found some scientific pen to add at least one more theory towards the solution of that *quæstio vexata*, what is phosphorescence?—*Robert Nelson, R.N.*

Variety of Lime Hawk-moth.—I found in my breeding-cage on the 23rd of April, a perfect specimen of the lime hawk, but such an extraordinary variety that I think a brief description may prove interesting to some of your readers. The insect measures two inches one line across the wings; the ground colour is very much lighter than in most specimens, but the peculiar and most marked point of difference is that the olive-green median band is represented only by a small, dark olive-green, heart-shaped spot, measuring only two lines in length and one in width, and pointing towards the hind margin. So different, in fact, is the appearance of the insect that a brother entomologist to whom I showed it thought at first it was a distinct species. —*W. Low Serjeant.*

Birds and Primroses.—Mr. Charles Darwin having expressed his opinion that the development of primroses was interfered with through birds biting off the young flower, apparently for the purpose of obtaining the nectar, *Nature* publishes letters on the subject from various parts of England. At Plymouth birds are in the habit of thus cutting the flowers of the polyanthus and primrose, and in Hampshire the same flowers are attacked by blackbirds. Dr. H. Gladstone says that both primroses and crocuses are thus bitten off by sparrows in London gardens, and Professor Thiselton Dyer noticed the habitual destruction of the crocus in the neighbourhood of Hammersmith by sparrows. On the other hand, persons writing from Hertford and Torquay have examined large beds of primroses which have not been attacked in this manner. It has been suggested, with some probability, that the birds may be in search of small insects which infest the flowers, and this should apply more forcibly in the case of the crocus, the nectar-bearing portion of whose flower is almost buried in the earth. The subject is still occupying considerable attention, and we draw attention to it in the hope that some of our readers may note down their experiences.

Neotropical Birds.—Dr. Sclater and Mr. O. Salvin have published a complete list of all the genera and species of birds ascertained to occur in Central and South America, or the region termed the Neotropical. This list enumerates no less than 3,500 species, above 2,000 of which belong to the Passerine group, and above 1,500 to the other orders of birds, every one of which, except that including the wingless birds of New Zealand, has its representatives in this region.

Larvæ from Paris.—I have little doubt that the larvæ found by "E. D. M.," at Paris, were those of the silk-moth, *Bombyx cynthia*, and that they were feeding on *Ailanthus glandulosa*, called by the Chinese the "tree of heaven." It somewhat resembles the ash, but more so the sumac. This tree is said to have been freely planted in the parks and gardens of Paris. I bred *B. cynthia* several years ago; the larvæ would eat the large leaves of young shoots of the laburnum, but only when a supply of *Ailanthus* was not at hand. I believe there are many examples of this tree in the London parks and squares, and some particularly fine specimens in St. James's Park.—*George Gascoyne.*

BOTANY.

The Colours of Flowers.—The one thing artists can never perfectly get is transparency, and this difficulty is almost insurmountable in the illustrations for a journal like the *Floral Magazine.* It is as impossible to represent the opal-like light seen passing through the petals of some white lilies as it would be to paint the rays of light playing about a diamond, or the blaze of fire from the sun itself. The best and purest scarlet colour used by artists, if placed by the side of the petals of a field poppy or geranium, immediately looks like a piece of clay. The same with crimsons: our best crimson lakes, when placed near the petals of some geraniaceæ, at once put on a liver-like appearance. Scarlets, in nature, are *transparent*, and such a thing as a transparent scarlet pigment is unknown. Now, if we glaze over one of our artificial scarlets with a wash of pure purple, the painting immediately looks like mud; but what is more common in some scarlet Orchids (as in *Masdevallia Veitchii*) than to see a vivid scarlet, shot with brilliant purple? On an examination of the epidermal cells with a microscope, some of the mystery is explained, but any attempt at imitation inevitably ends in failure. The same remarks apply with equal truth to all other tints—be they purple, blue, green, yellow, or orange. It is in the experience of every artist that, on looking at some flower possessing brilliant coloration, the tint he at first took for scarlet soon appears to him as scarlet-orange; when, on returning to the plant, it is crimson-scarlet, or a crimson possibly shot with some magenta hue. In every light flowers display new tints, new effects of light and shade, and new beauties, which the artist is indeed fortunate if he can at all catch. Yellows, as found in some Oncidiums, are very pure and lovely, and our chromes come nearest; but chromes are perfectly opaque, whilst the yellows in the Orchids are as perfectly transparent. It is common for artists to fail in their tints of green, not because of their non-appreciation of the colour, but because no artificial greens can be found or compounded to properly match nature. Some light-coloured roses are especially difficult; the petals do not appear of the same tint when detached from the flowers, and in matching the hue for imitation, the petals first appear rose, with a blush of transparent scarlet; then a suggestion of salmon-colour shows itself, or a glimmering of rosy-purple, which in theory seems impossible, but in nature is a reality. These tints, without doubt, all exist in the flower itself, but no artist, except the Great Designer of all flowers, can perfectly reproduce them. — *W. G. S., in Floral Magazine.*

Seaside Shrubs.—In his contribution headed "Seaside Shrubs," "T. B. W.," a correspondent of yours for last month, mentioned the *Atriplex Halimus.* Allow me to state that this Orache is used for hedges in St. Brelade's Bay, Jersey, to a considerable extent, and seems to answer very well. As "T. B. W." said, it appears to thrive best in a sandy soil; and I believe it to have been imported by a gentleman from Spain. St. Brelade's Bay is, to be sure, a very sheltered spot, but the shrub was recommended to me by a gentleman as suitable to be planted on a very elevated embankment to protect the lower portion of my garden from the westerly winds, where I have succeeded in growing scarcely anything else beside the alder, and it promises to do well. I have also noticed that it is being introduced into other parts of the island for forming thick low hedges between fields.—*A. Morley, Jersey.*

Remarkable Trees.—We are glad to notice that the subject recently discussed in our columns is being worked out elsewhere. Mr. George C. Atkinson has commenced a catalogue of the remarkable trees of Northumberland and Durham in the last number of the Natural History Transactions of Northumberland and Durham. This is a work that ought to be done for every county, and provincial Natural History Societies and Field Clubs might add it to their programme of work to be done.

To prevent Mould in Fern-cases.—If "F. J. S." slightly sprinkles the ferns several times a week with lukewarm water, the mould will soon disappear.—*W. H.*

Seaside Shrubs.—There is an Atriplex (*A. Halimus?*) growing in hedges at St. Leonards, a pretty shrub, with whitish frosted-looking foliage, which seems to flourish well on the "Hastings sandstone" of the Wealden formation; and I may as well mention a small wild shrub, the Sea Southernwood, or Bluish Mugwort (*Artemisia cœrulescens*), which I do not see described in ordinary botanical books: in one only, an old one, have I ever seen any notice of it, and to that was added, "it is said to be extinct." Some years ago, I saw abundance of it, growing close to the sea, between Newhaven and

Seaford, and I have no doubt but that it would grow more luxuriantly under cultivation. It also grows in one locality, at Clevedon, Somerset, but small, and sparingly; and I once met with it at Hythe. The foliage is greenish silvery-white, scented like garden southernwood, and the small reddish-yellow flowers are in nearly unilateral racemes, and are more delicate than those of the commoner species of artemisia.—*K. Lily Grey.*

Gresford Yew.—I have read Mr. Lee's article on the Yew, in the May number of Science-Gossip, with considerable interest, but I cannot submit either to his, or to any other man's theory, that the Gresford Yew, about which we have heard so much from time to time, is a single tree. I had examined this tree, perfectly unprejudiced, before I had read anything either about its supposed age, antiquity, &c., and I then came to the conclusion, which I have not yet seen cause to alter, that this tree is in reality three trees; *i.e.*, three young shrubs have many years since been planted, or sprang from seeds, in close proximity; these afterwards joined in the (bole) stem, and now form what appears at first sight only one stem; but if it is carefully examined, it will be seen, where the joinings take place, this union can be traced from the base upwards to the branches. Again, there can be but little doubt that all the trees, of which there are many in Gresford churchyard (now very old), were all planted at one and the same time: the reason why the others seem to have but small stems, in comparison with the "old one," so called, is, that they are single trees: in this only consists the difference. If the Gresford yew is ever unfortunately cut down, so as to divide the stem horizontally, it will then be discovered, beyond the slightest doubt, that there are three perfect trees, instead of one, as now supposed. I have no doubt there are many yew-trees in various parts of England of a much greater age than the celebrated Gresford specimen.—*J. F. Robinson.*

Sowerby's English Botany is published with an index to each volume, but without a general index. It is the intention, I believe, to publish a twelfth volume, containing the ferns and their allies, and a copious index; but these will be some time in preparation. In the meantime I have printed for my own use an index to the genera in two pages, and should be happy to forward a copy to any one desiring it on receipt of six stamps, or twelve copies for thirty stamps. It will be found by far the most convenient arrangement to insert a general index at the end of each vol., so that on taking any volume in hand, any genus can be referred to without having recourse to the twelfth volume.—*Latimer Clark, Sydenham Hill, London.*

British Hepaticæ.—A long-felt want is at last being supplied: Mr. Hardwicke, 192, Piccadilly, is bringing out, in monthly parts, at 2s. 6d. plain and 3s. 6d. coloured, a magnificent "History of the British Hepaticæ," from the pen of Dr. Carrington, of Eccles. The plates (especially of the coloured edition) are really artistic. The student is thus put into possession of a most attractive work, one that has long been wanted, in the cheapest and most readily obtainable manner. As a rule, scientific students are not overburdened with banking accounts, and, therefore, it is with real pleasure that we announce the publication of a first-class work that is to be obtained by the poorest. Author, artist, and publisher are to be complimented on the success of the first number, just issued.

Water Avens.—Smith speaks of *Geum rivale* as almost confined to the north, while Sowerby says, "more sparingly distributed in the south," where it appears to be absent from Cornwall, Kent, Surrey, and a few other counties. He does not instance Sussex. Yesterday (May 14) I saw this plant in flower growing luxuriantly by the side of a stream within five miles of Chichester, where its habitat had been discovered by a friend. Through the medium of your pages can you kindly aid our recently established Chichester and West Sussex Natural History Society by eliciting an answer to the inquiry—Has it been observed by any one elsewhere in Sussex?—*F. H. Arnold, LL.B., Fishbourne.*

The Potato.—In the report of the United States Commissioner of Agriculture for the year 1870, it is stated that this plant was growing in great abundance in that portion of Northern New Mexico lying between Fort Wingate and Fort Defiance. The Navajo Indians inhabit this section, and the native potato forms one of their chief articles of diet in winter. The women dig the root with whatever implements they can get, often using a strong smooth piece of wood with a wedge-shaped end. The plant grows on low, rich spots, and by spring the earth is torn up in every conceivable direction, in the search for potatoes. The tubers are quite small, one-half to three-quarters of an inch in diameter, of good taste, and somewhat like boiled chestnuts. The Navajo Indians consume so large quantities at one time, as to cause griping pains, and as a remedy take at the same meal a quantity of earthy matter containing magnesia, which relieves the stomach. In 1869 a quantity of these roots was received by the department of Agriculture from New Mexico, and distributed to various parts of the continent, where some of them have largely increased in size.—*H. G. G.*

Extirpation of Rare Plants.—The "Protest," in Science-Gossip, No. 111, page 68, is fortunatelytimed, and unfortunately too needful. All remonstrance on the subject seems to be vain. In former numbers of SCIENCE-GOSSIP have been most judicious appeals to botanists to stay the work of destruction; and in *Nature* of May 22, 1873, was a very forcible protest by the Hon. Sec. of the East Kent Natural History Society (Mr. Gulliver, F.R.S.) against the evil, which is mainly caused by the cupidity of trafficking collectors, and, strange as it may seem, by the conduct of some provincial societies and other parties, all with the best intentions. Certain Natural History Clubs are regularly in the habit of offering rewards to their members for the best and largest collections of the scarce and other plants of the district, thus holding out a premium for the destruction of the rarer species! Indeed, I have known more than one instance in which a candidate for this kind of distinction has actually destroyed all the remaining plants of a precious tuft or group of a species in order to defeat his competitors. But this is by no means so surprising as the fact that certain societies, mostly composed of educated persons, should be so woefully ignorant as to suppose that thus the interests of Science can be advanced; "in order," as their preamble often runs, "to promote the cause of botany among the members and their families." As if botany consisted in the grubbing up of plants, drying, and calling them by hard names; whereas premiums for the best collections of such useful orders as Graminaceæ and Amentiferæ, with illustrative drawings and dissections of the distinctive characters, the taxonomic value of pollen-grains and other cells, and of raphides and other plant-crystals, would afford good tests of the diligence and acquirements of the candidates, promote the knowledge of botany, and lead to no injury or destruction of rare species. Indeed, there are numberless subjects, such as Dimorphism, equally available and excellent. But, at all events, the present wanton and fatal rage against our most precious favourites should be sternly opposed; and it is to be hoped that SCIENCE-GOSSIP will continue to lend its powerful help to this end.—*Philophyton.*

GEOLOGY.

POLAR GLACIATION.—At a meeting of the Geological Society, a paper on this subject was read by J. F. Campbell, Esq., F.G.S. The author referred to a statement of Prof. Agassiz, to the effect that he supposed the northern hemisphere to have been covered in glacial times from the pole to the equator by a solid cap of ice. He described his observations made during thirty-three years, and especially those of last summer, when he travelled from England past the North Cape to Archangel, and thence by land to the Caucasus, Crimea, Greece, and the South of Europe. His principal results were as follows:—In advancing southwards through Russia a range of low drift hills occurs about 60° N. lat., which may perhaps form part of a circular terminal moraine left by a retreating polar ice-cap; large grooved and polished stones of northern origin reach 55° N. lat. at Nijni Novgorod, but further east and south no such stones could be seen. The highest drift-beds along the whole course of the Volga seem to have been arranged by water moving southwards. In America northern boulders are lost about 39°, in Germany about 55°, and in Eastern Russia about 56° N. lat., where the trains end and fine gravel and sand cover the solid rocks. Ice-action, in the form either of glaciers or of icebergs, is necessary to account for the transport of large stones over the plains, and the action of moving water to account for drift carried further south. There are no indications of a continuous solid ice-cap flowing southward over plains in Europe and America to, or nearly to, the equator; but a great deal was to be found on shore to prove ancient ocean circulation of equatorial and polar currents, like those which now move in the Atlantic, and much to prove the former existence of very large local ice-systems in places where no glaciers now exist. In the discussion which followed, Prof. Ramsay said the question was whether there were ice-caps moving towards the equator, or whether the configuration of the mountain regions might have produced the observed effects. He expressed himself satisfied that the present configuration would account, at least to a great extent, for the changes which have taken place. The boulders found on the great plain of Russia might have been conveyed either directly by glaciers, or by icebergs broken off the ice-cap itself. Boulders have been seen 40 miles north of the Caucasus, proving the existence there of great ancient glaciers. The absence of boulders on the plains of Siberia was to be accounted for by the absence to the north o Siberia of high land from which such boulders could be carried. Prof. Hughes thought that the theory of ice-caps spreading in both hemispheres from the poles to near the equator hardly deserved discussion, seeing that no facts which could not be otherwise explained had been adduced in support of it, whilst it involved great physical difficulties, and was quite inconsistent with the continuity of the forms of life from pre- to post-glacial times. He always understood that the boulders of N. Germany and W. Russia could be traced to that mountain-district, and that there was proof that the ice travelled to the north as well as to the south. Unless, therefore, the author showed that some of the boulders could have been derived only from circumpolar regions, he could not see the necessity of calling in anything more than changes of level of various parts of the northern hemisphere along well-known lines of elevation and depression to explain all the phenomena observed. He questioned the accuracy of the view that glacial conditions prevailed at the same time over the whole of even one hemisphere. Mr. Whitaker said the rounded configuration of rocks in Norway he regarded as clearly of glacial origin, but as the effect rather of a great extension of glaciers than of a true polar ice-cap. In Britain the glacial drift towards its southern limit is almost wholly marine, and certainly not due to the action of land-ice, so that it is distinctly opposed to the notion of the southern extension of the ice-cap. He could not believe in the existence of such a cap extending as far as the equator. Mr. Topley remarked that there is no drift in the south of Europe, and that a line running nearly in the latitude of Dover would mark the southern limit of the drift.

What is Basalt?—Our geological authorities say that basalt is a volcanic production. By a late analysis (see *Geological Magazine* for March last), it is found that the Massberg Basalt contains olivine and apatite. The latter is a phosphate of lime, or an earthy material of bones (Kane's "Chemistry"); the former is a product of salicine, which is formed of the bark and leaves of trees. As a product of decomposition, this basalt yields osteolite; this is a product of phosphorus, which exists in all animals and a few vegetables. On looking at several analyses of glass, lava, and slag, I find neither of the substances present. As all these may be derived from basalt, I should be glad to know if the absence of those materials, osteolite, apatite, and olivine, is due to their absence from the material giving the slag, lava, and glass, or whether, as they are animal and vegetable matter, they are lost to the product of basalt by the action of fire? If these items are convertible into other things by fire, how is it they were not so converted, if basalt originated from igneous action?—*H. P. Malet.*

The Sub-Wealden Boring.—Mr. Henry Willett, F.G.S., has published another letter in reference to the above exploration. He says:—"We have now run through about 400 ft. of Kimmeridge clay. Nearly every inch contains numerous fossil shells in various stages of growth, each of which has been born, has grown, and died. Our little 2-inch column has contained several thousands. There is no reason to doubt that this bed of clay extends uninterruptedly beneath Brighton, Chichester, Southampton, Sussex, Hampshire, and Dorsetshire, to Kimmeridge on the west, and beneath Hastings and the English Channel to the Boulonnais district in France, and that throughout the whole of this vast area, the same conditions of birth, life, and death have existed."

Post-Glacial Animals in Derbyshire.—At the last monthly meeting of the Manchester Geological Society, Mr. John Plant, F.G.S., exhibited a large collection of remains of *Bos priscus* and reindeer recently obtained from Castleton, Derbyshire. The largest bones were portions of the skull, with the horn-cones attached, femora, and vertebræ, all incrusted with stalagmite.

NOTES AND QUERIES.

Cloud of Butterflies.—On March 13th I heard from a fisherman of Worthing a curious fact, which, though it happened some few years ago, seems sufficiently interesting to record. Being about four miles off the coast, opposite Lancing, the wind (N.), which had been blowing fresh off shore all the day, suddenly dropped, and he and his "mate" found themselves in a dead calm. Suddenly, however, it came on to blow moderately from the S. or S.W., and brought with it a perfect cloud of butterflies, chiefly, I should imagine from his description, "Brassica" and its allies, though he speaks of other coloured butterflies as well, and also of moths and many other insects. So dense was the cloud that the mainsail was literally "smothered" with the insects resting after their flight. The main body, it appears, passed on to the shore, where they astonished the natives of Lancing and also of Brighton by their numbers. My informant's own theory is that the north wind of the morning had blown them from our shores out to sea, and that the south wind returned them to shore. But this does not satisfy me. If the north wind had been (which it appears it was not) a very violent one, I could understand a few individuals being carried out, but not a cloud of insects. Whence then came they? Were they emigrating? And does the fact assist the "blown-over" theory?—*Windsor E. Hambrough.*

P.S.—A specimen of *P. napi* appeared on our Parade here soon after Christmas-day.

Mirco-fungi.—In reply to a desire expressed in Science-Gossip for last month, I send the following extract from the "Handbook of British Fungi," by M. C. Cooke:—"*Puccinia truncata*, 'Iris Brand' Uredo-spores.—Spots yellow, sori small, pale red-brown, oblong and linear, scattered or aggregate, bullate; spores globose, or broadly elliptic, pale brown. Uromyces iridis, Lev., Cooke M. F., p. 376. Cooke L. F., no. 28. Cooke exs. no. 77. Uredo iridis, Eng. Fl., v. p. 376. Berk exs., no. 59. Brand-spores.—Spots obliterated; sori oblong, brown surrounded by the scarious epidermis; spores obovate-oblong, even, attenuated below, upper cell abruptly truncate.—B. and Br. Ann. N. H., no. 754. Cooke M. F., p. 196. On Iris fœtidissima, autumn." I have found the brand-spores mixed with the uredo-spores in the same pustule.—*S. A. Baretti.*

Ancient Trees.—In the August and September numbers of Science-Gossip, allusion is made to the Bull Oak in Wedgnock Park. If your correspondents are not already aware of it, they will be grieved to hear that that very grand old tree came to a sad, I may say an untimely end, a winter or two ago. I have been told by a gentleman who was resident in that neighbourhood, that it was set on fire by some boys, and completely destroyed; but whether this was done by accident, or for mere mischief's sake, I could not learn. I saw the tree about seven years ago, and was much surprised to see what remained of it looking so vigorous. I have not observed in your pages any mention of the yews in Norbury Park, near Leatherhead. They may not be in existence now, but more than thirty years ago I saw them, and was told that they were mentioned as a grove of *old* yew-trees in "Domesday Book." One of them was lying prostrate, having been blown down. It was sawn through at the butt, and, as far as my recollection serves me, was sound throughout—a most beautiful piece of timber, and destined, I believe, for a dining-room table. The oaks in Bagot's Park, Staffordshire, and the Snilcar Lawn Oak close by, will amply repay a visit; while, less grand, but far more picturesque, are some old oaks in a small remnant of Needwood Forest at Berkely Lodge, near Barton-under-Needwood. This is one of the most exquisite bits of sylvan scenery that I have ever seen.—*H. M. Mapleton.*

Yeast.—Can any of the readers of Science-Gossip furnish me with a few particulars concerning yeast? What is the cause of yeast fermenting a sugar solution? Does the yeast plant in its growth take some of the elements of the sugar to itself to enable it to propagate, and thus leave the other parts of the sugar to form carbonic acid and alcohol (please give formula of reaction)? What is the cause of yeast making bread light? Does bread undergo any fermentation by the action of yeast?—*S. J.*

Indiscriminate Collecting.—The article written upon the, now, universal destruction of species, more particularly of insects and plants, by "C.," I entirely agree with. I have been a naturalist from a very early period, and I am now seventy, and I can confidently say, from observation, that in the last few years many species of insects, chiefly of the favourite butterfly, are so far decreased, that, now science is being taught in our schools, there will not be species enough to supply the great demand of an army of boys with their great sweeping nets, and whose general practice is to take every specimen on the wing, partly to have a good store of duplicates, not allowing time to make a single *observation* or enjoy the delightful sight of seeing these charming creatures flit from flower to flower sucking their honeyed food, so kindly and beautifully provided for them in the innumerable golden cups of the earlier flowers, and throughout the year. Natural history is a science of observation, not of destruction. I am afraid it is of no use to write to these young beginners, or even to some older ones, whose pleasure seems to be in capturing a great number of individuals. Even when a new or rare butterfly makes its appearance, it is gone immediately, such as the Queen of Spain Fritillary; for if two or three do but make their appearance, some indiscriminate sportsman is down upon them, and they are not allowed a chance to spread over the country. What a beautiful land this would be if the pastures, hill-sides, and woods swarmed with the lovely butterfly. They are taken now in every state of their existence—the egg, the caterpillar, and the perfect insect; what chance is there for them? They must go, and that quickly,—all the most local and attractive species. Why do not the Linnæan or Zoological Societies, and other societies of naturalists, take the matter up? I am afraid they rather encourage it, in the hopes of getting a *new species.*—*J. B.*

Skeletonizing.—Can any of your correspondents inform me as to the best way in which to prepare the skeletons of birds, and also what is the easiest and most elegant form to mount them in when obtained?—*J. E. W.*

Sudden Appearance of Plants.—The following, which came under the notice of the writer some years ago, is offered in further illustration of the "Sudden Appearance of Plants" noticed in a recent number. In 1855-6, during the deepening and extension of the wells and adits at the Dover Waterworks, on the west side of the Castle-hill, a quantity of chalk was brought up, from a depth of about 200 feet, and temporarily deposited near the top of the well. This heap, containing several hundreds of cubic yards of newly excavated chalk, without any covering or mixture of soil or mould, was in the following year thickly covered with red poppies, to account for which no satisfactory or self-evident reason could be assigned. The most common plant immediately around the heap was the common wild mustard, or charlock, which grew in abundance; poppies were comparatively rare; they were common enough in the fields below, but not particularly so, and certainly nowhere seemed to take such exclusive possession, or to flower so freely, as on this heap of chalk. Again, three or four years afterwards, on the construction of the London, Chatham, and Dover Railway, a tunnel was driven under the Citadel Heights on the opposite side of the valley; a large quantity of chalk was similarly brought up and deposited near the mouth of the shaft. This, in the following season, was also covered with red poppies, presenting at the distance of more than a mile, a very conspicuous and somewhat remarkable appearance.—*H. Gooch, Cardiff.*

Field Clubs.—The members of St. Mary, Lambeth, Sunday School Teachers' Field Club, held their first outing of the season on Easter Monday, going to Box-hill, Dorking, Leath-hill, and surrounding neighbourhood. The fielding was very successful; several interesting specimens, geological and botanical, having been obtained during the ramble, including, among the latter, some fine specimens of mosses.

Lady-birds.—In a late number you invite explanations of the word "Lady-bird." In Kent, and perhaps other counties, that insect in called "Lady-bug." Now *bug* is the old English equivalent to the Latin word *insectum;* and in Kent all insects are popularly called bugs. "The air is full of bugs," is a common expression on a summer's evening: and more, various kinds of insects are specified by the suffix "bug" to their own names, as beetle-bug, cockchafer-bug, &c., while those sleep-staying pests, which we call only bugs, are with them "bed-bugs." But what about "lady"? It is said by some to have been "our lady's bug," these creatures being so useful to hop-grounds, by eating the "dolphin"; but I should rather think it is owing to the creature's gaudy colour; lady-bug thus meaning only painted or swellish bug, the fine madam of the family.—*Cyril A. Greaves, B.C.L.*

Plica Polonica.—I have been obliged to destroy a fine white Persian cat in consequence of its being affected with this peculiar disease. As a kitten its coat was perfectly healthy, but being occasionally washed, it lost all interest in cleaning itself, and the hair then became dirty and matted, as in the above disease.—*W. T. Iliff, Epsom.*

Snowdrop (p. 92).—I fancy that if your correspondent from Bradford Abbas would pay us a visit next winter, should we live so long, I could show him in a little copse, just over the stream at the bottom of my garden, an exhibition of this beautiful flower, which may be equalled, but can hardly be surpassed, at Over Compton. We have, however, often remarked here, that, contrary to his experience, the single-flowered snowdrop and the double-flowered garden variety appear to observe a very strict line of demarcation. I think I may say that we never find the double one on the opposite side of the little stream, which a man may jump across, and very rarely the single one on this side of it; and yet there is very little appreciable difference between them, in their character or culture.—*C. W. B., Bingham's Melcombe, Dorchester.*

How to get Skeletons of Animals.—"D. H." asks how to obtain skeletons without seeking aid from ants. I proceed thus: skin the animal, remove all internal organs, and as much of the muscular tissue as is possible by careful dissection, then macerate in water until all remaining muscle is sufficiently rotten to be scraped off with an ivory scraper or blunt penknife. Care must be taken at this stage not to remove the tendons surrounding the joints, or they will be disarticulated and the preparation spoiled. When every objectionable portion has been removed, the skeleton may be set up with cork and pins in a natural position, and allowed to dry, when a very perfect specimen will result. This description applies to mice and frogs, or any small vertebrate animal. Should a joint become disarticulated by accident, China cement will be found useful to unite it.

Microscopes.—"Enquirer" asks about microscopes. To my mind the simplest contrivances are the best, and a stage consisting simply of a plate of metal without any additions, save the spring to hold the slide when the instrument is inclined, answers all purposes. I find the mechanical stage unnecessary for the highest powers ($\frac{1}{25}$). The most serviceable instrument I believe to be Hartnack's: an excellent model is made by Baker, of Holborn. With regard to lenses, the maker decides the quality, and if "Enquirer" is wise, he will not buy a lens until some one has tested it for him, unless he obtains it from a maker who is above suspicion: the greatest discoveries were originally made with very inferior instruments. Might I ask why H. G. Glasspoole, in the excellent paper on the history of the potato, persists in calling that vegetable a root?—*S. W. Moore.*

Ancient Trees.—E. Edwards, in Science-Gossip No. 111, p. 56, truly remarks that our old trees are very interesting; and it is to be hoped that they will all soon be recorded. Two that I have seen he has not mentioned, both yews; one at Crowhurst, Surrey, three or four miles from Edenbridge; the other at a village of the same name, about six miles from Hastings, Sussex. These, perhaps, E. Edwards will visit and measure. All that I now remember of them is that they are of immense size, one of them (the Surrey tree) is much decayed in the centre, and that the tree at Crowhurst, Sussex, is a female with a treble trunk. Both of them are in the churchyards. The celebrated French botanist Decandolle is said to have travelled an immense distance to visit the venerable Sussex yew. And the same botanist examined a yew (since reported defunct), and made it out to be 3,000 years of age, in the churchyard of Bradbourne, Kent. Admitting the truth of this estimate, this tree may have been contemporary with Solomon's Temple. The "Conqueror's Oak," near the palings of Windsor Forest, is a huge hollow trunk of immense age, yet with flourishing branches.—*Q. F.*

The Mode of Looking at Pictures.—I was very much interested in reading Sir Frederick Montagu Pollock's article on "The Best Mode of Looking at Pictures." He advises us to look at objects with one eye. It has been my practice in looking at pictures to use the limp catalogue as a telescope, and the effect is wonderful; the vision excludes all the surrounding objects and puts the picture in a very becoming frame, and the definition is perfect. We feel as if we ourselves were standing in the picture. And also, in sketching, I am in the habit of looking at the landscape through a roll of drawing-paper, and in the bright sunshine the deep shade of the tube is wonderfully cooling to the eye. If these things are absent, we can easily produce the same effect with our natural hand. Let the thumb and forefinger be the eye-piece, and palm the tube.—*S. A. Notcutt, jun.*

Green Tree-frog.—A relation of mine had a green tree-frog which he brought from Paris, but from my observations I don't think that the barometrical powers of the animal are to be depended on. It seems simply a matter of convenience or digestion whether he goes up the ladder, which was in the bottle with him when he was bought, or not. He may do very well in France, but the weather in England being so very changeable no doubt puzzles him. He uses the ladder chiefly when going after flies, of which he is very fond. As flies are not to be had all the winter, we found a substitute for them in the shape of young cockroaches; but he does not like them nearly so well as flies,—not being so delicate perhaps. It is amusing to see him try to swallow a blue-bottle that is almost too large for him: if it will not go into his mouth easily, he forces it in with his fingers, or else lets it loose again and has another shot at it. The underside of his body seems to be covered with a number of suckers, as he has the power of clinging to the sides of the glass jar in which he lives without any difficulty. His colour changes slightly, being sometimes of a light yellow-green, and at other times a dark dirty sort of green. It is a very interesting little animal, and causes little trouble to keep.—*E. G.*

Raphides and Cuticles.—Will any of your correspondents kindly give a learner some information as to the best way of extracting raphides, and preparing them for mounting? Also as to how the cuticles of leaves—especially the tougher ones, such as ivy, evergreen oak, &c.—may be best detached? I have tried long maceration in water, with very unsatisfactory results. One book recommends boiling in strong nitric acid; but will not that destroy the texture entirely? What is said in books on these two subjects is too general to be of much use to a beginner.—*G. H. J., Weston.*

Scirpus lacustris and S. triqueter.—Can any of your readers tell me how to distinguish between *Scirpus lacustris* and *Scirpus triqueter?* The latter (*Scirpus triqueter*) and *S. carinatus* are said, in the "Flora of Surrey," to be plentiful on the Surrey side of the Thames from Mortlake to Kew. I have frequently searched in that locality, and find abundance of a large *Scirpus* which has *not* a sharply triangular stem, and which seems to me scarcely distinguishable from *S. lacustris*. This latter is not down in Brewer's "Flora of Surrey" as growing in that part at all, but *S. triqueter* is. I find, too, so many different descriptions in different books, that I am quite puzzled to know which is right. Thus Bentham gives the stem of *S. triqueter* as sharply triangular, while Withering, quoting Roth, says it has *blunt* edges. Again, Bentham says the name of *S. carinatus* is given sometimes to a variety of *S. triqueter* and sometimes to a variety of *S. lacustris*. Can the three be really distinct? I find a plant wonderfully like *S. maritimus* plentiful about Hammersmith and Putney.—*T. W.*

Cat and Rat.—The gentleman whose house I am staying at told me a singular story yesterday of a large brown rat and a black tom cat that had seemingly struck up a friendship in his house a couple of years ago. The rat would come and feed in the same dish with puss, and they were often seen playing about in the hall of an evening together, but, alas! the servants became timid, and broke so many articles because, "the nasty rat frightened them," that his doom was pronounced, and my host, gun in hand, sat on one of the chairs to watch. The rat appeared at last, followed by puss, who, called by his master, came towards him, and then the gun was pointed and fired, but, strange (for my friend is a crack shot), it missed, when puss sprang forward on his old playmate, and soon killed him. It seemed as if the cat, on seeing W. B. fire, had suddenly become aware that the rat was an enemy; or at any rate considered objectionable.—*Helen E. Watney.*

Local Names.—Perhaps the following local names with which I have met in the given counties, may interest some of your readers. In North Devon the Wren is known as the Crackie; the Yellowhammer, as the Gladdie; the Blue Tit, as the Blüspicker; the Chaffinch, as the Daffinch; the Bullfinch, as the Hoops, pronounced like Hüpps. In South Pembrokeshire the Wheatear is called the Cooper; the Missel-thrush, the Greybird; the Wren, the Cutty Wren; the Corncrake, the Bean-cracker; the Heron, the Longie-crane; the Guillemot, the Eligny.—*L.*

A Protest.—I quite concur with your correspondent "C" in his protest against the gradual extermination of the rarer species of our birds, insects, and plants by persons calling themselves naturalists. Several cases have come under my personal notice, where large quantities of one species of lepidoptera have been taken in a single day by one individual. One fine April day I inquired of an entomologist what sport he was having, when he told me he had taken over a gross of Myrtilli; on another occasion I was shown four dozen *P. corydon* impaled in one large collecting-box. If this sort of thing goes on much longer, I am afraid many of our comparatively rare and local species of lepidoptera will share the same fate as the large copper butterfly, *C. dispar*, and many others, which have been actually exterminated by the continual raids of persons who style themselves naturalists and entomologists, but who are nothing more than dealers.—*E. Lovell.*

Larvæ from Paris.—I feel confident, from the description, that reference is made to *Bombyx cynthia*, the Ailanthus Silkworm. This was originally introduced from Japan, and has become acclimatized in France, and is often found at large. It is now one of the species of silkworm to which attention is given by amateurs in this country. The natural food are the leaves of the *Ailanthus glandulosa*, called by the Japanese "the Tree of Heaven." This has been largely introduced here of late years, not only as furnishing food for worms of *B. cynthia*, but also for its beautiful foliage. I have at times given moths their liberty, but have never found worms in a wild state on my own trees, or on others in the locality. I do not think they are so freely planted here as in France.—*S. H. Gaskell, Stockport.*

Bleaching Skeleton Leaves.—In reply to your correspondent "J. L. B.," page 68, in March No. of Science-Gossip, I find it very useful when I experience any difficulty in bleaching the leaves prepared by the caustic process, to expose them, of course beneath a glass shade, or other screen, to prevent them becoming dusty, to the sun, for several days. I find, even after preparing the leaves very neatly, so as to exhibit all the smaller veins, I have ruined the specimen by bleaching them in chloride of lime: it is apt to render them exceedingly brittle, so that the slightest touch breaks them. Would it not be better to bleach all the specimens by the agency of the sun? It may perhaps tax the patience of most naturalists, but the reward will be gained in the end.—*J. F. R.*

Mouse eaten in the Trap. — The house of your correspondent Mr. Warry (see page 71), March No. of Science-Gossip, is evidently infested with either blackbeetles or cockroaches,—perhaps the latter: these will in a few hours eat a mouse, excepting only the skin and bones. I have seen it done repeatedly, and for a time I was puzzled equally as much as your correspondent to account for this strange thing, until I caught them in the very act.—*J.F.R.*

Squirrels.—I extract the following from a weekly paper, dated February 15th.—"On Saturday, some men felling timber in a wood near Cudham, Kent, cut down an old hollow oak-tree, when upwards of 30 squirrels rolled out, most of which were dormant, or in a state of semi-sleep; but upon being roused they dispersed to various parts of the copse. A large stock of nuts and acorns was found stowed away in the hollow of the tree, which had been collected by these industrious little animals as a provision for the winter. It is common to find squirrels laid up for shelter during winter, but it is seldom such a swarm is found together." The above, if true, was a very remarkable occurrence. Unfortunately, however, the newspaper paragraphs on natural history are seldom to be relied upon, as every naturalist knows. Putting aside the correctness or incorrectness of the above, I should like to ask the readers of Science-Gossip whether they have ever met with a similar instance of the hybernation of the Squirrel, and whether it is a recognized fact among naturalists that the Squirrel lays by a store of food for winter use? A few years back, I was sadly taken to task by a celebrated naturalist for presuming to affirm that the Squirrel is both a partial hybernator, and also a storer of winter provisions. If the above account is correct, the dignified "shutting-up" I received on that occasion was, to say the least, undeserved. The Squirrel bears a very indifferent character in this neighbourhood. I am told that it robs rooks' and pheasants' nests, nibbles off larch shoots, and stores away large quantities of nuts in holes and chinks of trees. Early in the year it pays occasional visits to a row of spruce-firs close by, for the sake of the cones. These it adroitly strips of the scales by biting them neatly off at the roots. The object in view is to secure the seed nestling under each scale. The cones of the pine are also similarly treated by the Squirrel. *W. H. Warner, Kingston, Abingdon.*

Wood-mouse (*Mus sylvaticus*).—This beautiful long-tailed, black-eyed mouse often strays into houses in the fall of the year, sometimes in broad daylight. In January and February of the present year five of these mice were taken in traps in the upper part of my house, a colony having established themselves under the flooring of the garret.—*W. H. Warner, Kingston.*

Parrots.—The anecdote related by G. O. Howell (p. 236, last vol.), of a parrot extinguishing a burning cigar-end with cold tea, is so marvellous that I cannot refrain from inquiring if the action was so carefully observed as to leave no loophole for doubt that it was designed. It is certainly beyond the scope of what is termed a natural instinct, and it is difficult to conceive a bird observing and taking note of the fact that the application of a fluid destroys combustion.—*G. Guyon, Ventnor.*

The Seven Ash-trees in Tewin Churchyard.—Though these be out of the ordinary route of excursionists from London, they are well worth a visit, both to the botanist and the antiquarian, since an old tradition attaches to them. These trees, seven in number (I believe), have attained considerable size, and their position is indeed singular, and being so closely crowded together, they at once rivet the visitor's attention as he enters the churchyard. They have all sprung from the grave of Lady Ann G——, which is covered by an oblong monument, and surrounded with railings. The trees have broken through and broken up the stone in all directions, and have also strangely contorted the iron railings, some portions of which are imbedded in the wood. For its protection from the knives of visitors, an outer inclosure of wood has now been placed around the grave. But the story currently reported to explain this phenomenon is as follows. The lady, one of several persons here interred, and shortly after whose decease the trees began to grow, was an unbeliever of the Christian doctrine of the resurrection of the body, and is asserted to have remarked on her death-bed, "that it was just as likely her body would ever rise again as that seven ash-trees would grow from her grave," or something equivalent to that. According to the tradition, the upspringing of the trees duly followed; and it is added, as a confirmatory circumstance, that the ash is rare in the locality. Of such belief one would not speak lightly, even if one regarded the phenomenon as quite explicable on natural causes. It is at least singular that the trees were not interfered with at the time they first began to upheave and split the stone. Perhaps some of the readers of Science-Gossip can give us analogous cases, or some other version of the story. No doubt exists that trees do occasionally force their way to the light by displacing stone or rock; but the appearance of these ash-trees is suggestive of something out of the common way.—*J. R. S. C.*

Slugs.—I met some years ago with a gardener who used sawdust for the protection of his young plants against the ravages of slugs; he told me it formed an effectual barrier to their inroads, but, happily, I have not had occasion myself to put his plan to a severe test. In order to *destroy* these enemies, the Rev. J. G. Wood, in his work on "Our Garden Friends and Foes," strongly recommends sprinkling the ground, especially the sheltered spots in which they hide themselves, with a weak solution of ammonia. Mr. Wood stirs the solid ammonia into boiling water, and then adds cold water until it is sufficiently diluted, taking care to perform the operation in the open air, and standing on the windward side of the vessel. To avoid a needless prolongation of pain, he advises that, after the ground has been thus watered, some one should go round to pick up the slugs, earthworms, &c., provided with a jar of the same liquid, in which to drop them.—*W. R. H.*

On the Mode of Looking at Pictures.—The article by Sir F. Montagu Pollock, on p. 97, on monocular vision as requisite for the proper observation of a painting, suggests another condition essential to be observed if we wish to obtain a natural view of a picture; I mean that of viewing it from, as nearly as may be, the same position and distance, as those in and at which the artist stood at the time of its execution. Without entering into a mass of detail which may be found set forth in any book on perspective (and in none more perspicuously than in the little work "Perspective," by Major Collins, R.E.), it will suffice to say here that the eye of the observer must be in, or near, the direction of the original line of sight, or he will see everything more or less distorted. If, for example, a perspective view of a long room be hung high above the observer's head, he will see all the furniture apparently sliding down-hill, and about to tumble down upon him out of the frame. This single example will suffice to show the folly of the method of arrangement of paintings in certain Exhibitions and Galleries.—*W. N.*

Looking at Pictures, &c.—I believe the late R. Beck contrived an instrument for looking at pictures and drawings, particulars of which, I have no doubt, will be given by Messrs. R. & J. Beck, and which most likely will be found similar to that made by Mr. Newman.—*A. de Souza Guimaraent.*

Moths' Wings.—Do moths fold their wings over their backs as butterflies? I caught, as I thought, a moth the other night, but it had this peculiarity.—*S. A. B.*

Ladybird.—"R. H. M." in your last issue, gives us the German for this little insect. During a residence of two years in Germany, I never heard it called "Marien*h*äfer" (meant doubtless for Marien*k*äfer); "Sonnenkäfer" or "Sommerkäfer" being its usual name. I see, however, that the dictionary gives Lady-day as "das Fest Maria," &c.; and so, perhaps, "R. H. M." has some ground for his explanation.—*G. E. L.*

Communications Received up to the 14th ult. from:—F. K.—W. K. B.—E. E.—R. N.—W. H.—H. J.—W. S. jun.—H. E.—W. R. H.—L. R.—F. M. P.—P. H. G.—E. T. G.—W. S. K.—J. G.—G. S.—H. A. S.—W. F. H.—C. U. A.—G. H.—S. W. M.—W. R. H.—W. H.—E. W.—C. W. B.—H. H.—L. H. W.—W. H. H.—B. P.—C. A. G.—F. D.—G. G.—T. R. P.—G. W.—W. V. A.—W. T. I.—H G.—J. H. W.—W. H. J.—F. W.—S. S.—T. M. G.—W. R. H.—W. N.—H. B.—W. L. S—A. F. D.—J. G. M.—Dr. M.—H. B. T.—J. E. V.—H. P. M.—J. T. T. R.—A. M.—R. H. P.—L. W. S.—A. de S. G.—F. A. B.—R. H. M.—F. B. S.—H. H. C.—K. B.—H. W.—J. F. R.—J. B.—J. F.—H. G. G.—J. H. C.—G. F. H—H. G.—W. F. S.—G. E. L.—G. C. C.—B. C. S.—C. C. U.—G. S. T.—R. B. L. J.—E. E.—W P.—T. G. M.—J. P. S.—J. H.—W. W. N.—F. W. I.—H. E. F.—C. J. W. R.—W. M.—G. G.—R. S.—W. L.—C. P.—F. H. A.—H. R. W.—J. S. H.—D. H. T.

NOTICES TO CORRESPONDENTS.

A Subscriber.—The object sent is a bundle of the empty egg-cases of the *Natica*, a univalve marine shell.

A. De S. G.—We are much obliged to you for having written as you have to the gentleman named in your letter; but it is not our practice to publish letters which have already been sent.

G. F. H.—We prefer seeing Doubleday's list with all the synonyms, to seeing the latter cut out except the name by which the insect is now known. In all good museums you see the former practice adopted.

H. G.—The Cluster-cup is *Æcidium violæ*.

K. L. G. desires us to say, with reference to his paragraph in last month's Science-Gossip, on the "Geology of Clevedon," that he has found encrinital fragments in the magnesian limestone and conglomerate.

The Potato.—A misprint occurred in Mr. Glasspoole's article on this subject. It was stated that an early kind had been introduced into *Ireland*, "where barley will not grow." It should have been *Iceland*.

F. B. S.—Your specimen is the Early Spring Orchis (*Orchis mascula*).

Dr. M.—The plant is *Ballota nigra*.

J. P. S.—The *American Naturalist*, published monthly, does for the United States what we attempt in Science-Gossip—the publication of popular scientific articles and notes.

D. H. T.—See an article on "Collecting and Preserving Birds' Eggs," in the April number of Science-Gossip, for 1872.

R. B. L. J.—The box was forwarded as directed.

P. S.—The mineral is iron sulphite, not copper at all.

T. Pryke.—The insects are the black *Podura*, or Springtails, which belong to the order *Thysanuridæ*.

Emma B.—The plants are (1) the Granulous Saxifrage (*Saxifraga granulata*), (2) Tuberous Buttercup (*Ranunculus tuberosus*), and (3) Moschatel (*Adoxa moschatellina*).

W. Benson.—You had better obtain Mrs. Lankester's "Wild Flowers worth Notice" (coloured illustrations). London: Hardwicke.

EXCHANGES.

Primrose Sports, &c.—Will any one send me small living plants of *Primula elatior* (Jacq.), or of any of the sports or varieties of Primrose or Cowslip (such as Hose-in-Hose, &c.)? I wish to make some experiments with them, and will, of course, pay postage, or send dried plants in exchange.—W. R. Hayward, Devonshire-road, Forest-hill.

Clausilia biplicata for *L. glutinosa*, *L. glabra*, *L. involuta*, *H. rupestris*, *H. lamellata*, any Vertigos, or others.—J. Groves, 13, Richmond-terrace, Clapham-road, London.

Wanted, *Fusus propinquus*; will give other good species in exchange.—F. Walker, Belvidere, Tenby.

First-class Slides, for Aquatic Larva of *Dytiscus*, *Notonecta*, *Ephemera*, *Nepa*, &c., and for *Volvox*, pure and clean. Lepidoptera wanted in the season.—Edmund Wheeler, 48, Tollington-road, Holloway, London, N.

Larvæ of *Callimorphia dominula* for Birds' Eggs or British Marine or Land and Fresh-water Shells.—Sidney Smith, Castle-street, Walmer.

Marine Algæ from Galway Bay, in great variety, living or dried Mosses. Irish and Scotch Ferns, 50 species and varieties (list free), in exchange for the following books:—Moore's or Newman's "British Ferns;" W. H. Grattann's monthly parts of "Marine Algæ;" "Half-hours at the Seaside;" "Where there's a Will there's a Way," &c.—T. MacGann, Burrin, Oranmore, Ireland.

Wanted, *Trientalis Europæa* for *Chrysosplenium alternifolium*.—Address, George Wright, 15, Channing-street, Rupert-street, Bolton-le-Moors.

A Collection of about 1,100 Stamps in Lallier's Album (1873). I am open to offers of anything useful.—Reply, by post, L. H. Whitmore, 24, Mark-lane.

Leaves of Variegated Tropical plants, fine Ferns for case, Flower Seeds, &c., for objects in Natural History, suitable for Village Museum.—H. Elliott, Braywick, Maidenhead, Berks.

Shells to Spare.—*Helix Pisania* (Tenby), *Conovulus* and *Assiminea* (R. Thames). Wanted, *Paludina contecta*, *Lymnea glabra*.—Address, W. H. Hatcher, Belmont Works, Battersea, London.

Very Fine Leaves of *Eleagnus* (scales polarize) in exchange for any good unmounted Microscopic Objects.—W. H., 40, Marine Parade, Worthing. P.S.—Also leaves of *Pilomis*.

For Mounted Section of Cuttle-bone send unmounted good transparent injection, preserved in glycerine, to W. Sargant, Jun., Caverswall, Stoke-on-Trent.

Will exchange named specimens of Wild flowers, fresh specimens, for mutual improvement.—Dr. Morton, New Brompton, Kent.

For specimens of *Trichobasis petroselini* on Leaves of *Smyrnium olusatrum* (Alexanders), send stamped directed envelope to Herbert Jenner, Lewes. Any other Micro-fungi acceptable.

Wanted, Scientific Books; good Microscopic Slides offered in exchange.—R. H. Philip, 23, Prospect-street, Hull.

First-class Slides of pure gatherings of *Rhabdonema arcuatum* and *Gomphonema geminatum*, &c., for other really good Slides or material.—H. B. Thomas, Boston, Lincolnshire.

I should be glad to exchange Coleoptera and Lepidoptera with any of the readers of the Science-Gossip.—R. H. MacAdam, 4, Bedford-terrace, Bedford.

British Marine Algæ to exchange for anything. Eggs of the Merlin, Scoter, Harlequin Duck, Golden Eye, and Little Auk, to exchange for other rare Eggs.—J. T. T. Reed, Ryhope, Sunderland.

Puccinia chrysosplenii for *Æcidium soldanellæ*, *Endophyllum sempervivi*, *Puccinia rhodiolæ*, or *Puccinia scrophularia*.—Rev. J. E. Vize, Forden Vicarage, Welshpool.

Shells Wanted.—*Succinea oblonga*, *Pisidium obtusale*, *Helix fusca*, *Limneas periger*; varieties, *acuta*, *marginata*, and *lineata*. Offered: *Helix obvoluta*, *Unio margaritifera* (English), *Achatina acicula*, *Clausilia dubia*, *Succinea gracilis*, and *intermedia*.—W. F. Sutton, Gosforth Grove, near Newcastle-upon-Tyne.

Irish Marine Algæ, mounted and duly assorted, for South Devon and Cornish Sea-weed, in the same form.—Henry Goode, 15, Mulgrave-street, Plymouth.

Duplicate:—Actæon. Desiderata:—Daplidice, Iris, T. pruni, T. betulæ, Lathonia, P. Acis.—B. C. Stilwell, Wellington College, Wokingham.

For portion of anterior wing of *Papilio Epius* (China), mounted, showing scales *in situ*, send other good Slide to J. P. Smith, Legh-street, Wokington.

Wanted, well-preserved specimens, with fruit, of *Myosurus minimus* and *Actea spicata*, for class teaching. Offered rare British Wild Plants.—W. Piper, Bank Plain, Norwich.

Graphiola phœnicis on Date Palm, well mounted.—Send list to C. C. Underwood, Eaton Lodge, Castlebar-road, Ealing.

Well-mounted Diatoms for other equally well-mounted Slides—entomological preferred. Lists exchanged.—M. D., The Esplanade, Deal.

Preserved Larvæ of Dominula and Caja, for Lepidoptera, Minerals, or Birds' Eggs.—Address, W. W. Nettleton, Eyne-street, Batley.

Wanted, the first twelve numbers of the *Quekett Journal*. Two dozen good Slides offered.—H. E. Freeman, Rose Villa, Wood Green, N.

For Brittle Star-fish, send stamped envelope and object to C. P., Innox Cottage, Corscombe.

Eggs of Kingfisher, Dipper, Kestrel, Common Snipe, Ray's Wagtail, and others, for good Eggs. Unaccepted offers not answered.—R. Standen, Goosnaigh, near Preston, Lancashire.

Monthly Microscopical Journal, vols. 9 and 10, bound, and other Entomological and Microscopic Books, for first-class Entomological Slides.—J. S. Harrison, 48, Lowgate, Hull.

Star-fish Tubercles, Seed-case for Polariscope, or *Puccinia umbilici*, offered for other good Objects.—Send stamped envelope and objects to Rev. W. Locock, Corscombe Rectory, Dorchester.

Fresh-collected Cluster-cups on *Ficaria*, *Æcidium rubellum*, and *Urticæ*. Also a few on *Arum maculatum*. Mounted or unmounted. In exchange for good microscopic slides. Send list.—G. Garrett, Harland House, Whestead-road, Ipswich.

BOOKS RECEIVED.

"Grevillea." May.

"Monthly Microscopical Journal." May.

"Les Mondes."

"Land and Water."

"American Naturalist." January, February, and March.

"Boston Journal of Chemistry."

"Journal of Applied Science." May.

"Elementary Physiology." By F. Le Gros-Clarke. London: S. P. C. K. Society.

"Elementary Geology." By Rev. T. Bonney. London S. P. C. K. Society.

"Domestic Floriculture." By F. W. Burbidge. London and Edinburgh: W. Blackwood.

THE HISTORY OF OUR CULTIVATED VEGETABLES.

No. III.—GARLIC (*Allium sativum*).

THE Garlic is a hardy, perennial, bulbous-rooted plant, growing naturally in Sicily and the South of France. It was well known to the ancients, and is mentioned in connection with onions and leeks in the Bible. Homer makes it part of the entertainment which Nestor served up to his guest Machaon :—

> "Honey new press'd, the sacred flour of wheat,
> And wholesome garlic crown'd the savoury treat."

Some authors state, however, that the Greeks held this root in such abhorrence, that those who partook of it were regarded as profane.

The Romans gave it to their soldiers, with an idea that it excited their courage; and to their labourers to strengthen them. Virgil alludes to their restorative powers in one of his Eclogues :—

> "And for the mowers, faint with summer airs,
> Wild thyme and garlic, Thestyles prepares."

Pliny writes, touching garlic, that it is singularly good and of great force for those that change air, and come to strange waters. He states it is a sovereign medicine for many maladies; especially such as are incident to country peasants and labourers. He recommends those who wish to keep garlic and onions from sprouting, to dip the heads of them in warm salt-and-water. He describes one variety, growing in Africa, which, on being bruised in a mortar with oil and vinegar, it is wonderful to see what a froth will arise, and to what a height it will swell: he tells us that this kind of garlic was never planted on level ground, but on little hillocks like molehills, and that as soon as they showed their leaves, the mould was taken away from them, for the oftener they were laid bare the larger the heads would grow.

This plant was first cultivated in England in 1548. Tusser alludes to it in his twelfth verse for the month of November, thus, "Set garlick and beans at St. Edmund the king." It was held in greater repute by our ancestors than is in accordance with modern English tastes. The root of this plant is composed of several lesser bulbs inclosed in one common membranous tunic, and easily separated from one another; these are called cloves, and are the only parts used, being generally introduced only for a short period into the dish while cooking, and withdrawn when a sufficient degree of flavour has been communicated. The whole plant, especially the cloves, has a most acrimonious taste and offensive odour, so powerful and penetrating, that if a piece of the plant is applied to the feet its scent is soon discovered in the breath, and when taken internally its smell is communicated through the pores of the skin even to the fingers. It is said that if a clove of garlic be kept in the mouth it is an effectual preservative against infection; and a receipt printed in 1665, a drink of garlic and warm milk, to be taken fasting, was recommended as a cheap medicine to prevent the infection of the plague.

In Afghanistan the inhabitants rub their lips and noses with garlic when they go out in the summer, and affirm that it secures them from the evil effects of the hot winds.

In some countries this plant has a superstitious charm attached to it; that of driving away evil spirits, and the practice of sprinkling with garlic-water those whom they wish to be preserved from harm, used to be a custom with some of the inhabitants of the Chinese seas. Old Fuller referring to this plant says, "Some avow it soveraigne for men and beasts in most maladies, though the scent thereof be somewhat valiant and offensive"; and Sir William Temple in his "Treatis on Health and Long Life," says, "Garlic has, of all plants, the greatest strength, affords most nourishment, and supplies most spirits to those who eat little flesh"; he also states that it is a specific remedy in gout. It was greatly commended by old writers as a cure for ague; and is still in Kent, and probably in other counties, placed in the stocking of the child afflicted with the whooping-cough, in order to allay this malady. (See Pratt's "Flowering Plants," &c.)

There are several varieties of garlic natives of our country. The Crow Garlic (*A. vineale*), not unfrequently found throughout England and the south of Scotland, also near Dublin; its leaves are sometimes used as a salad. The Broad-leaf Garlic or Ramson (*A. ursinum*). Moist shady groves and thickets are its favourite habitation, and the copious snow-white flowers, enlivening many a shady dell, might be seen with pleasure, if the odour of the herb, whenever it is bruised or trodden upon, did not so frequently infect the air around. In olden times this plant was considered by our ancestors highly beneficial to health, as we learn from one of our oldest proverbs which reads thus in modern English:—

"Eat Leeks in March and Ramsons in May,
All the year after physicians may play."

Ray considers the island of Ramsay to have taken its name from the quantity of the broad-leaf garlic or Ramson which grows there. In Kamtschatka this plant is much prized by the inhabitants, both as a medicine and as an auxiliary article for food. The Russians, as well as the natives, gather it in large quantities for winter use. After being steeped in water, it is mixed with cabbage, onions, and other ingredients, the whole forming a ragoût, which is eaten cold. This plant is there considered as almost a specific against the scurvy, no sooner lifting its head above the snow than the dreadful disease loses all its horrors; at even the worst stages a cure is produced by the plentiful use of the wild garlic. According to Skinner, the word garlic is derived from the A.-S. *Gar*, as applied to a lance, and as *Lear*, a leek,—from the leaves rising like lances or javelins.

Shalot or Eschalot (*A. ascalonicum*) is a relative of the Onion, and was formerly called Scalion, from Ascalon, a town in Syria, near the Mediterranean, from whence the Greeks first procured them. Pliny says the Ascalonian onions are proper for sauce. The time of its introduction into this country is not known; some writers think we owe it to the crusaders. Turner mentions it as a well-known plant in his "Signes of Herbs," published in 1548. This plant resembles the true garlic in having its roots divided into cloves or smaller bulbs, inclosed in a thin membrane. Each of these small bulbs sends forth two or three fistular awl-shaped leaves, issuing from a sheath; they are nearly similar but not so large as those of the Onion. The Shalot does not in all situations produce perfect seeds or even flowers, therefore some old authors denominated it the barren onion from this circumstance. The want of seed is, however, fully compensated by the multiplication of the bulbs. The flavour is much more pungent than that of the Garlic, but not so rank.

The Chive (*Allium Schœnoprasum*) is the smallest though one of the finest-flavoured of the genus. It is a hardy perennial plant, an inhabitant of Northern Europe and Russian Asia, said to be a native of Britain, though rarely found growing in a wild state. The leaves, which resemble small rushes, are used for salads, &c., and in some cottage gardens it is planted as an edging to the flower-beds.

The Leek (*A. Porrum*) is a branch of the Onion family, and is said to be indigenous to Switzerland; but it has been for so many years under cultivation that its native place cannot, perhaps, be very accurately traced. Pliny states that the best leeks were brought from Egypt and the next to them from Orthe, now called Guzelhizar, a town about 15 miles from Ephesus. This great naturalist relates that this vegetable was brought into notice and esteem through the Emperor Nero, who used to eat them for several days in every month to clear his voice. He took them with oil only, debarring himself even from bread on these days.

The exact period when the Leek was introduced into this country is not known. "Hortus Britannicus" states that it was about 1562; but they must have been in cultivation much earlier, as they appear to have been used by the Welsh as far back as we can trace their history. Tusser sings their praises in verse, and says they were in common use in farm-houses long before his time. Gerard, who wrote soon after, mentions leeks in such a manner as to induce us to think them indigenous to our soil; he says, "Leeks are very common everywhere in other countries, as well as in England." The hardiness and pungency of the Leek both tend to recommend it in those countries where few potherbs are grown, and it seems to have great facility in adapting itself to climate. The Leek which is cultivated in the colder parts of Scotland, and thence is called the Scotch leek, is more hardy and also more pungent than the broad-leaved variety, chiefly cultivated in England. It was formerly a very favourite ingredient in the "cock-a-leekie" of the Scotch, which is so graphically described in "The Fortunes of Nigel" and of which James the First is reported to have been so fond that he retained his preference for it notwithstanding all the dainties of London cookery.

Coles, in his "Adam in Eden; or, Paradise of Plants," a curious old work published in 1657, says, concerning leeks:—"The gentlemen in Wales have them in great regard both for their feeding and to wear in their hats on St. David's day."

Worledge, writing in 1668, gives a good idea of the love of the Welsh for these kinds of odoriferous vegetables. "I have seen," says he, "the greater part of a garden there stored with leeks, and part of the remainder with onions and garlic."

The origin of the Leek as an emblem of Wales, and being worn on St. David's day, has given rise to much controversy at various periods. A writer in the *Gentleman's Magazine* for February, 1735, states that on the 1st March, 640, the Welsh, under the command of King Cadwallo, gained a great victory over the Saxons, and had at the same time put leeks in their hats to distinguish themselves, fighting near a field which was replenished with this vegetable, which has ever since been esteemed as a badge of honour among them.

Townsend gives the same account in his "Manual of Dates," but places the event a hundred years earlier. Shakespeare alludes to the custom of wearing the Leek by the Welsh in the fourth act of his "Henry V." A contributor to a periodical work (the *Gazette of Fashion*, 1822) thinks it more probable that leeks were a Druidic symbol employed in honour of the British Ceudven or Ceres. In which hypothesis he thinks there is nothing strained or far-fetched, presuming that the Druids were a branch of the Phœnician priesthood. Both were addicted to oak-worship, and during the funeral rites of Adonis at Byblos, leeks and onions were exhibited in "pots with other vegetables," and called the gardens of that deity. In Egypt leeks and onions were also deposited in the sacred chests of the mysteries both of Isis and Ceres. This vegetable is represented among the Egyptian hieroglyphics; sometimes a leek is on the head of Osiris, and at other times grasped in an extended hand.

Porrus, a leek, is derived by Bryant from the Egyptian god Pi-orus, who is the same as the Baal Peor of the Phœnicians, and the Bel or Bellinis of the Druids. Théis gives another derivation to the word, and says it is from *pori*, to eat, in Celtic; whence comes our word porridge, in which leeks formerly constituted an ingredient.

It is stated in Hooker and Arnott's "British Flora," seventh edition, that *A. Porrum*, the garden leek, is nowhere found truly wild. Bentham says, in his Handbook, it is believed to be a cultivated variety of *A. Ampeloprasum*, which is found in two or three spots in Western England, but supposed to have been introduced, or the remains of ancient cultivation. Most of the Onion tribe have sulphur in their composition, as well as free phosphoric acid.

The bulb of the Onion is in reality not a root any more than the Potato, but an underground bud, containing all the parts hereafter to be developed. The Potato is an underground stem, or rhizome, covered with buds or eyes, from which new plants are produced. I will now conclude my paper on these odoriferous and pungent vegetables with some lines from a Harl. MS. in the British Museum, written no doubt by a Welshman:—

"I like the leek above all herbs and flowers,
When first we wore the same the field was ours.
The leek is white and green, whereby is meant
That Britons are both stout and eminent.
Next to the lion and the unicorn,
The leek 's the fairest emblem that is worn."

HAMPDEN G. GLASSPOOLE.

ON APHIDES.

It is difficult for the rose-cultivator to look with any degree of interest at the swarm of green plant-lice which sometimes infest his choicest specimens, or for the farmer to contemplate placidly the black pests which are destroying his bean crop; but the life-history of these creatures is so curious, and so replete with interest, that the mere naturalist may be excused if he sees in them something to admire. I have no doubt more than one species of aphis is more than sufficiently well known in appearance to all my readers, but I doubt if we have all taken our revenge so fully as we might have done, by making them reveal the secrets of their wonderful economy to us in return for the damage they have done to our floral pets.

The Aphis, or plant-louse, belongs to the order Homoptera, and the genus is a very large one, numbering, I believe, some three hundred and twenty species, almost every one of which requires its own peculiar plant to supply it with nourishment. The species with which we are most familiar are those found in the rose, bean, hop, and fruit-trees. The damage done by the hop-fly, as it is called, is sometimes very great, affecting the duty to the extent of many thousands of pounds. Other species cover the stems of plants, or infest the under surface of the leaves, causing them to form hollow cavities of a red colour, in which they find a perfect shelter. Their mode of feeding is to draw up the sap through the rostrum, and thus, by diminishing the vigour of the plant, they produce deformity and injury to the fruit or flowers. It is said that they do not attack plants in perfect health, and this I believe to be the case generally, but whether it always holds good I cannot say; certain it is that any circumstance (drought, easterly winds, &c.) which checks the vigour of the plant is favourable to the attacks of the aphis. I have also noticed that an improvement in the health of the plant is attended by a corresponding decrease in the aphides, and that they will again multiply should the plant exhibit fresh signs of sickliness. The suddenness with which they make their appearance, and the vast numbers acquired in a very brief period, are wonderful: the plants in a whole field of beans will appear to be covered in a few days; but this will be less astonishing when we consider the mode of reproduction and the rapidity with which it takes place. Sexual intercourse takes place only in the autumn, after the insects have become fully developed; the female then deposits her eggs in some secure spot, where they remain

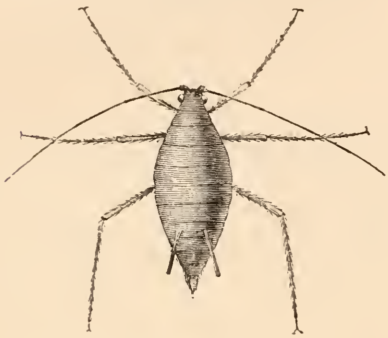


Fig. 92. Wingless Aphis (magnified).

dormant through the winter, the first genial days in spring bringing forth not the perfect-winged form which produced the egg, but the well-known wingless form which is so familiar to us all. This wonderful fertile larval form is possessed of great fecundity, but it is its mode of reproducing which is so remarkable: this is carried on by internal gemmation, the young one being produced alive, and differing from its parent only in size. This process of development goes on for several generations without any change in the form of the insect; at the close of the summer, however, the fertile forms which have not reproduced themselves pass, by metamorphosis, into the perfect insect, males and females, for the most part winged. These, after pairing, produce the eggs which are to be hatched in the ensuing spring, after which they die. During the summer numbers complete their metamorphosis, and appear as winged insects. The larval form which will undergo the final metamorphosis may easily be recognized, the bulbs in which the wings are inclosed being visible on either side the thorax. I have separated many of these, and placed them under a glass shade, but in no instance have they reproduced, the development continuing until, after the final shedding of the skin, they have appeared as fully-developed winged insects. These have never produced eggs, and I think were all males; it seems probable that although winged insects are produced during the summer, it is not till the autumn that the perfect females are produced; all the fertile larval females which I have kept, either alone or under the same shade with the winged form just mentioned, having increased rapidly in the usual way, and in no instance produced eggs. The perfect insect is very different from the larval form, and under the magnifying-glass a very handsome object, with six long legs, graceful antennæ, shining wings and spotted sides, also a pair of curious projecting tubes, stand-

Fig. 93. Winged Aphis (magnified).

ing out like horns, near the extremity of the abdomen, of which more hereafter. This intermediate but fertile form of the aphis is an example of the nursing system of Steenstrup, observed also in the vegetable kingdom in the case of the ferns and horse-tails, which increase by spores, which, falling into the ground, produce the *prothallium.* The prothallium never becomes a fern, but on it are formed the true generative organs which produce the embryo afterwards developed into the perfect plant. This case differs from the aphis in the nurse-form (the prothallium) producing the generative organs.

The echinoderms, &c., exemplify other variations of the same phenomena. Mungo Ponton thus describes the fertile nurse-form and the way in which it is illustrated by the aphis:—"By fertile nurse-form is to be understood an organism which becomes fertile without ever attaining, or at least before having attained, the perfect form due to its species. . . . In simple metamorphosis, it is one and the same individual organism that passes through all the stages, from the form which it wears on leaving the egg, to that which it assumes on attaining the perfection belonging to its species; but in the case of a fertile nurse-form, it is in general only those forms which are produced by the nurse that ever attain the specific type. So likewise, in simple concurrent reproduction, it is one and the same organism that exerts both the power of individual multiplication and the faculty of sexual generation; whereas in the case of fertile nurse-forms, it is seldom they possess both; but if the nurse be endowed with the one, its offspring will be endowed with the other." ("The Beginning: its When and its How," pp. 242–3.) It sometimes occurs that the nurse acquires the power of sexual generation, also that the species passes through more than one nurse-form, either similar or diverse, before attaining the perfect form of the species. In the aphis is found one of the most decided examples of the fertile nurse-form (and one which it is very easy to study), the immature females standing in that relation to the perfect insect.

These fertile females, as has been said before, reproduce by internal gemmation, the bud falling into a proper receptacle in the parent's body, and being produced alive, exactly like its parent, except in size; each female producing from 50 to 100 young ones. So rapidly do they increase, that it has been calculated that from one individual there might be descended, under favourable circumstances, the enormous number of 4,000 billions in a single summer.

Were it not for its many enemies, the increase of the aphides would be beyond all bounds; but fortunately for us its enemies are very numerous. Birds consume great numbers, but the larvæ of the Ladybird, feeding exclusively on the aphides, destroys them wholesale, extracting all the soft parts, and leaving the empty skins to testify to their enormous appetites. The larva of the beautiful lace-winged fly destroys great numbers, as does also that of the various species of Syrphidæ. In July, 1869, we were visited by a great plague of aphides, and all the three species I have named speedily made their appearance also in great numbers. The ladybirds swarmed in countless numbers, and immense numbers of their unsightly larvæ soon appeared. The rapidity with which these larvæ cleared the aphides from a hop-plant in my garden was truly astonishing. The clusters of curious pedunculated eggs produced by the Lace-wing fly were numerous, as were the perfect insects, than which nothing can be imagined more delicate and beautiful or a greater contrast to its larva, which from its voracity has been named the aphis-lion.

Another foe is a small species of Ichneumon which deposits its eggs in the body of the aphis, the larvæ feeding upon its soft parts. The brown and swollen skins of the insects thus infested may frequently be seen, and if placed by themselves in a glass-topped box, the active little ichneumons will soon burst through their prison and reveal the secret of the death of the unfortunate aphides.

There is another curious chapter in the history of the aphis which is worthy of notice. It is the unfair treatment which it receives at the hands (or antennæ) of the ants. Linnæus calls the aphis the ant's "cow," and the use to which this sagacious little insect subjects it fully justifies the term. The aphides eject from the two tubes before mentioned as situated one on either side of the abdomen, a quantity of saccharine fluid, which is very attractive to the ants, and forms in some cases almost their only food. This fluid may be noticed overspreading the leaves of plants infested by these insects till they have a glazed appearance, and seem to have been washed with honey and water. It is commonly called "honey-dew," and was long a puzzle as to its origin. Not only do the ants consume the fluid voluntarily ejected by the aphides, but by a peculiar movement of their antennæ upon the bodies of their "cows," excite them to an increased supply. This has not inaptly been called "milking." But even this is not all. Kirby and Spence give a most wonderful account of the way in which some species of ants, particularly the yellow ant (*F. flava*), convey the aphides to their nests, and keep them there for the supply of their necessities. The yellow ant makes prisoners of a root-feeding species of aphis (*A. radicum*), and even carries off its eggs, which are tended with care and placed in situations favourable for their early development.

I think it will be allowed that whether we consider the aphis as a marked example of the wonderful "nurse-form," as described by Steenstrup in his "Alternation of Generations," and one accessible for study to us all; or whether we confine our attention to its life-history and the singular connection between it and the ant, to which it is so serviceable, there is ample scope for observation, and that too of a character, from the delicacy and exactness required in its pursuit, which must of necessity be good training, should it even only extend to verifying the observations of others on this interesting but generally unwelcome little creature.

HISTORY OF THE DIATOMACEÆ.

(Concluded.)

PROFESSOR H. L. SMITH has published his second instalment of his translation of the "Historical Preface of Kützing." This is for the most part a record of Kützing's own labours. In his "Synopsis Diatomearum" he separates the true Diatomaceæ, with hard and glassy shells (valves), from the softer-shelled forms, which he called Desmidieæ. This seems to have caused some complaints, of a desire on the part of the author to unduly multiply species; but he remarks that "not only all the species established by myself stood proof, but even many a form mentioned by me as a variety, was established by others as distinct species."

Ehrenberg took the trouble, in his third "Aid to the Knowledge of Larger Organisms in the direction of the smallest space,"* to reduce most of the forms established by me in the Synopsis to such forms as were known to him; but later he has established the same forms as distinct species, in his larger work on the "Infusoria." (Ehrenberg did not publish his great work on the diatoms, "The Microgeologie," until some few years after Kützing had given his "Bacillarien" to the world. This work is a monument of patient but misdirected labour. The figures occupy 39 folio plates, and are far better than any previously published. The plan he adopted was to give a representation of all the forms that appeared in the field of the microscope, under a power of about 100 diameters. Grouped around the circle containing these forms were separate drawings of them, enlarged to about 300 diameters. This arrangement, although useful in some respects, was open to many objections, not the least of which was the necessarily heavy cost and large bulk of the book, for, not content with giving a large and small representation of an object, it was repeated again and again if it occurred in different deposits.—F. K.)

Kützing explains that the inferiority of his figures was owing to the indifferent microscope he used, and goes on to say that, however insufficient his instrument, he made by it his most excellent discovery, viz., the siliceous nature of the Diatomaceæ, which soon led, through his friend Henri Fischer, of Pirkenhammer, near Carlsbad, to the other important discovery of the fossil deposit of these organisms. "I had already, in my Synopsis, called the substance of which these shells were composed 'glassy,' because I had even then suspected siliceous earth in these frustules. I communicated these to my friend Bilz, an expert equally renowned as botanist and chemist, at the same time asking him whether he would investigate chemically specimens which I would send to him. Bilz, however, declined the commission, stating that he had no practice in the chemical investigation of microscopic objects." The matter rested for a short time, until recalled to the author's mind while investigating some Characeæ. "I placed some charæ in dilute muriatic acid, in order to remove the lime crust that was in the way of microscopic investigation. In the course of examination I found that the soft chara stems were on the outside garnished all over with diatoms, which were not at all affected by acids. Notwithstanding the twilight that had already commenced, I treated these diatoms in separate watch-glasses with concentrated acids, applying muriatic, nitro-phosphoric, and fuming sulphuric acids. The colour of the internal parts became, under the first influence of the acids, beautifully green; but further investigations with the microscope had to be postponed until the following day. After a sleepless night, the examinations were continued at the break of day, and at eight o'clock on the morning of May 8th, 1834, I had not only the full certainty of the siliceous character, but also of the iron contents of the diatoms. The diatoms which had been brought into contact with the concentrated acid had not changed otherwise than that their internal matter had disappeared."

The author afterwards tried the action of soda and a blow-pipe flame on a small mass of diatoms. The solution of these in the soda followed completely, and he obtained a perfectly transparent glass, which, on cooling, appeared of a vitriol-green colour, indicating the presence of oxide of iron. The interest of the preface may be said to conclude here; the remainder of it is taken up with acknowledgments of the kindness of various gentlemen who forwarded to him material from their own herbaria, and a complaint that Ehrenberg did not acknowledge, excepting very briefly and unsatisfactorily, his discoveries of the siliceous nature of the diatomaceous frustule, and the presence of iron in them. Kützing says—"I was somewhat astonished to see in Ehrenberg's large work on Infusoria the iron of the Gallionellæ mentioned as his discovery, while he does not even allude to the fact that I, in my essay sent to the Berlin Academy, mentioned iron as a general constituent of diatoms. It is easy to believe here in a 'turpinate.'"

(Perhaps some of the readers of SCIENCE-GOSSIP may be able to explain this expression; I am unable to do so myself.) F. K.

* This title is somewhat obscure. The original is "Zur Erkenntniss grosser Organisation in der Richtung des kleinsten Raums." I understand it to mean an aid to the knowledge of that large number of organisms occupying the smallest space.—F. K.

A HALF-DAY'S PLANT-HUNTING.

MY friend, Dr. M., having snatched half a day from his arduous professional duties, we drove off from home at 1·30 P.M., with the intention of visiting the great chalk ridge at Boxley, and afterwards the village of Boxley at its foot, through which meanders a small clear stream of water, which issues from beneath the chalk escarpment.

In our journey through the woods we made numerous halts in order better to examine the nature of the flora. The woods in this district are grown for the sake of hop-poles, &c., and are cut down periodically at intervals of from seven to ten years. In the clearings thus produced the botanist finds at all times a rich reward for the trouble expended in hunting through them. The summer after they are felled a great and varied selection of plants makes its appearance, including many rare and curious orchids, the Herb Paris, &c. &c.

The trees themselves, of which these low woods are composed, are well worthy of note. Among a great many others we noted *Pyrus Aria*, *P. torminalis*, *P. Malus*, *Prunus communis*, *P. Cerasus*, *Viburnum Lantana*, *V. Opulus*, *Carpinus Betulus*, *Castanea vulgaris*, *Euonymus Europæus*, *Rhamnus catharticus*, &c. Beneath these trees we found immense beds of woodruff, and pretty little masses of the beautiful *Oxalis acetosella*. *Poterium sanguisorba* is everywhere very abundant on the chalk. By the way, self-fertilization is somewhat carefully provided against in these plants. The flowers are in dense heads, the upper flowers being pistilliferous and the lower staminiferous. The stigmas of the upper florets are in a receptive condition a considerable time before the staminiferous florets open—indeed, when these latter open, the stigmas are withered and dried away. Thus it is rendered impossible for the florets on any given head to fertilize each other. The pollen must be brought from some other plant, or at all events from some other flower-head.

Arrived at Boxley Hill we wandered about in search of specimens, and were soon richly rewarded for our trouble. Some years ago I found *Atropa Belladonna* growing on the wooded hill-side, and in the hunt to find it again, which proved unsuccessful, we met with the beautiful Fly orchis (*Ophrys muscifera*), the unique beauty of which cannot be understood from any description; it must be seen to be appreciated. Many non-botanical friends to whom it was shown were highly delighted, and bore testimony to the correctness of its name by suddenly exclaiming, "How like a fly!" "It might be used as a bait for fly-fishing," &c. &c. Near the same place we found the lovely *Cephalanthera grandiflora*, the curious *Aceras anthropophora*, some fine specimens of *Orchis maculata* and *O. pyramidalis*. My friend at this point began turning over large stones in an old chalk-pit, and we were greatly astonished to find beneath almost every stone a fine specimen of Blind-worm or Slow-worm (*Anguis fragilis*). The names of this lacertian appeared to us to be sad misnomers, for the creatures are very active when aroused, and far from being blind, they possess a pair of very sharp and extremely pretty eyes. We caught three, which were liberated after a careful examination.

In this pit we found the pretty *Helleborus fœtidus*, a great number of orchids, and a splendid plant of *Rosa rubiginosa*, which occurs in great abundance in this neighbourhood, &c. &c.

Among the plants here adorning the greensward were *Hippocrepis comosa*, *Anthyllus vulneraria*, *Lotus corniculatus*, *Helianthemum vulgare*, and *Polygale vulgare;* and Columbine (*Aquilegia vulgare*) was very abundant in the thickets. We met with several specimens of a white variety of Herb Robert (not common, I think).

Tea was consumed in a lovely quiet lane near the wood. We preferred roughing it thus to driving into Maidstone. Here all our senses were gratified at one and the same time. The scenery is delightful, and, owing to the rugged nature of the ground, much land is incapable of cultivation, and many miles of hills are covered with plants and trees of great variety, growing in rich luxuriance. Hundreds of yew-trees stud the hill-sides, their dark sombre foliage contrasting finely with the intermingled richer greens of other trees. The barer spots are everywhere thickly dotted with juniper-bushes, which grow here in great abundance. About a hundred feet above us towered a white cliff of chalk, in which numerous jackdaws and starlings had built their nests, and with clamorous cries were busily performing their parental duties. In one part of the cliff a windhover had taken up its abode, and we were highly amused by watching the occasional concerted attacks made upon him by jackdaws, which did not seem to relish such a formidable neighbour. On an old wall we found *Linum catharticum*, *Saxifraga tridactylites*, *Linaria cymbalaria*, *Arenaria serpyllifolia*, *Sagina*, *Lactuca muralis*, *Asplenium ruta muraria*, several specimens of epilobium, and last, and most noteworthy of all, *Meconopsis Cambrica*. The finding of this last fairly astonished us, as its station is much to the west and north of us. Has it previously been recorded from this part of Kent? The small stream along the roadside was profusely ornamented with brooklime (*Veronica beccabunga*), *Potentilla anserina*, the Siums, &c. A wall, alongside which flows the stream, was covered about its base with the lovely golden saxifrage (*Chrysosplenium oppositifolium*).

From here we followed the course of the stream, and were rewarded by once more finding many an old floral friend, the sight of which recalled to us other days. A pleasant ride home in the cool evening air, enlivened by the richly-modulated song of the nightingale, the peculiar thrilling notes of the nightjar, and the mellow call of the cuckoo, brought our much-enjoyed afternoon to a close.

New Brompton. J. M. Hepworth.

Cockatoos.—It may interest some of your readers to know that a rose-breasted cockatoo which I have had in my possession for eighteen years, and kept quite alone, laid an egg in its cage on March 13th. It is white, and of an oval form.—*G. A. D.*

"In studying a flower, the first thing to do is to look at it well, so as to get a good notion of its general form and appearance; and in proceeding to dissect it, the beginner must start with the idea that he has a machine made of several parts, more or less complicated, to pull to pieces."—*Masters's "Botany for Beginners."*

HYDROZOAN ZOOPHYTES.

As I wished to examine a few small zoophytes, I established a tiny aquarium in a small glass vessel, fitted up with appropriate seaweeds; in a few days I discovered a group of four hydrozoan polypes, on a frond of small weed. They were stiff and rigid, having each four tentaculæ. I took them for a young growth of *Coryne pusilla*, or something,

Fig. 94. Hydrozoan Zoophytes (*Coryne pusilla*) on sea-weed. *a*, nat. size of young Medusæ. *b*, ditto magnified as seen when attached to glass.

of the kind. Soon after a little knob appeared on one of them, and then on the others the same thing took place, and the number of polypes increased. I did not notice them much, until one morning I was surprised to see a beautiful little medusa swimming in the glass. I immediately thought of the "buds" on the polypes, and on looking for them I found that one was still "on the stocks," so far matured

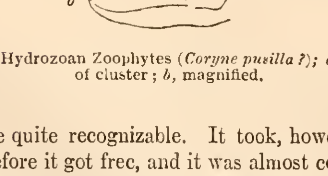


Fig. 95. Hydrozoan Zoophytes (*Coryne pusilla ?*); *a*, nat. size of cluster; *b*, magnified.

as to be quite recognizable. It took, however, five days before it got free, and it was almost comical to see its efforts to pull itself away from the stem. They are now still very lively, swimming about, and often visiting the spot where others are growing. The stem gradually dried up after the medusa was free. I should much like to know if any one had made these observations before. L. R.

NOTES ON THE STARLING.

Although we have many of our small birds protected, there are yet some for those who love to raise young birds from the nest, and perhaps one of the most beautiful is so left, for few birds are more handsome than the Starling (*Sturnus vulgaris*), and certainly none more deserving attention, for, added to his spotted, richly-shaded, purple and gold feathers, he has a talent which should recommend him to all lovers of the feathered tribe,—he is a good mocking-bird, and may be taught to talk and whistle several tunes by simply repeating them at feeding-time, or a few times during the day. The starlings are not migratory birds, but congregate in large flocks, when they are sometimes seen darting and floating after the manner of the swallow, feeding on the wing, rising and falling in a most pleasing way; yet with all their gambols they display much caution,—ever wary,—indeed, in some instances they are like the magpie; but when tame the whole of their ability may be turned to good account. See one at home in a hole in a tree or under the eaves of a cottage. Cunningly he selects his abode for the rearing of his young, sometimes but a few feet from your door, whence he may be seen to dart into a hole or cleft in a tree with food for its young, and we soon see the sleek, well-fledged young, peeping after the parent, and in the month of June the brood is led forth to learn to provide for themselves. Busily they may be seen in the sheep-walks, seeking food close to the feet of cattle, giving us an illustration of their instinctive cunning. But at this time we have not the elegant bird before mentioned—he is yet wearing his dusky feathers. In the month of July or August he begins to moult, and we shortly see those beautifully spotted feathers which transform this bird of exquisite symmetry into one of our handsome English mocking-birds. The Starling is insectivorous, very hardy, easily raised from the nest, and becomes remarkably tame. The cruel practice concerning the cutting of this bird's tongue is all nonsense; the bird will talk much sooner and better if his tongue be not cut. The nestling starlings should be fed with scalded bread, fig-dust, hard-boiled egg, and a little bruised hemp-seed, well mixed; or you may give them fig-dust and raw meat, taking care to prepare them fresh food daily. As soon as your nestlings can feed themselves, they should have a cage as large as the blackbird's cage, taking care to keep them very clean, allowing them to be plentifully supplied with water, and the cage well gravelled. Chas. J. W. Rudd.

"Smoking flowers with brimstone is a very good, simple, and cheap way of drying flowers, especially asters, roses, fuchsias, spireas (red flower kinds), ranunculuses, cytisuses, &c."—*Burbidge's "Domestic Floriculture."*

TERATOLOGICAL NOTES.

AUGUST 1st.—Noticed to-day a fuchsia, of which the leaves were arranged in three different ways: not only on the same plant, but also on the same branch, there were leaves opposite, alternate, and in whorls of three, and on one branch two whorls of three leaves each, bearing a flower-bud from the axil of each leaf. Are we to suppose that this is caused by a non-development of internodes, or is there a better theory to account for it?

(N.B.—I believe Mr. Lindley is in favour of the suppression of internodes.)

Fig. 96. Garden variety of *Ranunculus Asiaticus*—*a*, the 3 folioles of the Calyx, or Involucre; *b*, the coloured inner foliole, or abortive petal; *c*, the foot-stalk of the Flower.

May 16th.—On rich, light, sandy loam, in Church Cemetery, Nottingham, an abnormal specimen of *Trifolium pratense* or of *T. medium* (Bentham); the whole plant apparently full and healthy. Examined three heads of flowers, two of which exhibited the monstrosities.

The following is a description of one of the flowers, and may be accepted as a type of the rest:—

Calyx.—In two whorls; the inner of four, the outer of nine sepals. *Sepals.*—Divided halfway to the base, with subulate teeth.

Corolla.—Nine oblique petals, arranged in an apparently rosaceous manner (these situated between the outer and inner whorls of the *calyx*), then five small, unequal, crumpled organs inside the inner whorl, and seemingly stuffing up the centre of the flower, and not all on the same plane, but crowded upon the central column. *Petals.*—The outer ones red-purple, the inner quite green; unguiculate, and the nine outer ones incurved one over the other, like the blossom of an apple, but more crowded.

Stamens.—Eleven perfect ones cohering into a central solid column, and about six very imperfect green filaments at the top; these were all of various lengths, and scattered amongst the imperfect petals upon and around the column.

Pistil.—No trace, though the column, solid from the centre to the top, appeared looser in texture at the base.

The spikes of flowers were very fine ones. On them were counted 41, 45, and 66 flowers, the latter one having no abortive ones;—at least, none were noticed. The monstrosities were all at the base of the spikes, those flowers at the top being pretty regular, though every flower on the two heads appeared to possess more than its normal number of *sepals*, the average being 6-fid.

June 9th.—A lady found to-day a specimen of the red garden daisy, with one large centre flower, the involucre very loose and spreading, and having fifteen other daisies, half the size of the central one, springing from between the scales of the involucre. This is, I believe, a very good specimen of the Hen-and-chicken daisy.

June 23rd.—While plucking some flowers from a plant of the common blue lupine, noticed a peculiarity about the leaves. The leaves of this well-known plant are commonly on long stalks, with a number of lanceolate leaflets arranged in a stellate manner upon the top of the stalk, and all upon the same plane. In this case, however, the leaflets appear to be arranged in two or three rows, and in a spiral almost imperceptible, excepting that they are alternate with the ones above. One of the leaves consisted of 29 such leaflets.

July 21st, 1873.—Perhaps the following is as good an illustration of the transitions between *sepals* and *petals*, &c., as could be found in the Ranunculus family. A garden variety of *Ranunculus asiaticus* produced, instead of a flower, one long stalk, on the top of which were three green expansions of a leaf-like form, and one within, and alternate, of a bright red colour, and of remarkable shape. The best idea of their appearance may be formed by supposing the involucre of the Wood Anemone (*A. nemorosa*) to be formed of three sessile leaflets, one-third of an inch broad at base, and divided from halfway up into numerous divisions, like the ordinary leaves of the species. Within these, and springing from the same centre, one tripartite flattened expansion, coloured red, the two lobes entire, the other one approaching the divisions of the leaves, and coloured with green streaks up one side. The illustration may make this plainer.

RECENT PALÆO-BOTANICAL RESEARCHES IN VICTORIA (AUSTRALIA).*

WITHIN the last four or five years a considerable amount of light has been thrown upon the Tertiary flora which flourished in the south-eastern portions of the continent of Australia, previous to and during the deposition of the matrix of a large portion of the alluvial gold which has been obtained from that auriferous region. Through the researches of Baron von Mueller, M.D., F.R.S., with material collected and supplied by Dr. R. B. Smyth, F.G.S., the energetic Secretary of the Victorian Mining Department, and Mr. Mining-Surveyor Lynch, a fine series of fruits and seed-vessels have been described, and their affinities determined, so far as the remains would permit, from one of the "deep-leads" of the colony. The results of these investigations have appeared from time to time in the "Reports of the Mining Surveyors and Registrars of the Colony of Victoria," accompanied by lithographic illustrations of the fossils, executed by the lithographer to the Department, Mr. R. Shepherd. An interesting paper on the same subject was read before the Geological Society, but was published only in abstract.

The fossils in question were obtained from the auriferous "wash-dirt" of the Haddon "lead," Smythe's Creek, Smythesdale, county of Grenville, and were found at the bottom of the "wash-dirt," near the up-turned edges of the bed-rock (Silurian). This stratum, at both spots at which the fruits were found, and separated from one another only by a short distance, was succeeded by a gravelly drift containing trunks of trees. This, in one instance, was overlaid by alternations of clay and sandy drift, in the other by similar beds, and a thick bed (100 ft.) of basalt ("blue-stone"), giving respectively sections of 76 ft. and 156 ft.

Coniferæ are represented by a usually five-celled woody strobilus, to which the name of *Spondylostrobus* (*S. Smythii*), F. v. M., has been given. The generic affinities of this pentamerous conifer place it near *Solenostrobus*, Bowerbank, from the London clay, but, unlike the latter, the five fruit-valves are unkeeled, and there is a considerable columellar development not seen in the London clay genus. The last-named character is considered by Baron von Mueller as sufficient to separate it from all cupressineous genera, fossil or recent.

The *Sapindaceæ* are perhaps represented by spherical or oval two- or three-celled fruits, the valves of which separate completely to the base, and are externally rough and deeply wrinkled from verrucular protuberances. Von Mueller has named these *Phymatocaryon* (*P. Mackayi*), and consider that they also approach London clay forms, viz., *Cupanoides*, *Tricarpellites*, and *Wetherellia*.

A series of globular one-celled bony fruits, deeply perforated at the base by an oval aperture, and not clearly related to any known genus of recent or fossil plants, are described under the name of *Trematocaryon* (*T. McLellani*), F. v. M., and are demonstrated as possessing characters in common with both *Verbenaceæ* and *Sapindaceæ*, but that the balance appears to weigh in favour of a reference to the former family.

The next genus of this interesting genus is that announced by Baron von Mueller as *Rhytidotheca* (*R. Lynchii*), for the reception of elongate and attenuate, five solid-valved fruits, wrinkled or rough at the dorsal portion, and without a columella or free central axis. These are supposed to have belonged to a meliaceous tree, possessing an outward resemblance to the fruit of *Flindersia Strzeleckiana*, F.M., but probably more closely allied to the satin-wood tree (*Chloroxylon*).

Under the name of *Plesiocapparis* (*P. prisca*), F. v. M., is described a large, one-celled, depressed and globular fruit, having a diameter of two inches, and a hard, almost bony, pericarp. The form of this fruit and shape of the seeds indicate, perhaps deceptively, the Baron remarks, a plant allied to the caper-bush (*Capparis*), approaching perhaps the *C. Mitchelli*, Lindley, an Australian desert tree, found existing from the Murray River to the Gulf of Carpenteria, a range of 20° of latitude.

So far as a small amount of material would admit, the presence of proteacean plants in the gold drifts has been established. Large round or ovate one-celled fruits, with a thick and hard nutshell, to which Baron von Mueller has given the name of *Celyphina* (*C. McCoyi*), appear to indicate a tree closely allied to *Helicia*. This supposition is borne out by the occurrence of other bony compressed rounded fruits, smooth and bivalved, measuring about two-thirds of an inch, and distinguished under the name of *Conchotheca* (*C. rotundata*), with a general resemblance to the fruits of some tropical *Gervilleæ*, but still differing from them.

Finally, the term *Odontocaryon* (*O. Macregorii*), F. v. M., is applied to certain fruits of undetermined affinity, ovato-globular, uni-locular, and terminated by four large unequal teeth, and derived "probably from a large evergreen tree," whilst that of *Penteune* (comprising three species, is given to certain five-valved, ovate or globose fruits, with exceedingly thick and woody valves, and without a central axis. The general conclusion to be arrived at by Baron Mueller's very interesting investigations amongst these vegetable fossils of the gold drifts appears to be that, at the time of the deposition of the sediments in question there existed in that part of Australia now comprised within the

* Reports of the Mining Surveyors and Registrars of the Colony of Victoria, for the Quarters ending March 31st, 1871; June 30th, 1871; September 30th, 1871; September 30th, 1873; December 31st, 1873. Melbourne: By Authority.

limits of Victoria, and perhaps further, a flora representing a warmer climate than at present existing. Of such a nature are those fruits described under the names of *Rhytidotheca*, allied to the satin-wood tree; *Celyphina*, probably allied to *Helicia*, a genus of east and north Australia, and tropical Asiatic trees, but not now living in Victoria, whilst *Conchotheca*, perhaps one of the tropical *Gervilleæ*, bears no resemblance to any member of the family at present comprised in the flora of Victoria. Lastly, we must not lose sight of the affinities borne by some of these fossil fruits to those of the London clay. R. E., Jun.

THE MOUTH OF THE CRANE-FLY.

THE following description of the mouth of the Crane-fly must be taken by the readers of Science-Gossip *quantum valeat*, as addressed by a "Student and Lover of Nature" to "Students and Lovers of Nature." It consists in great measure of a comparison of the mouth of this insect with that of the Blow-fly, as described in Mr. Lowne's "Anatomy of the Blow-fly,"* and in offering it for publication I venture to hope that while it may contain a sufficient substratum of truth to render it acceptable to the public, any inaccuracy of statement into which I may have fallen will be kindly corrected by those who may be qualified for the task. I pass over any general description of the mouths of insects, as this has been lately in much better hands than mine, and for the sake of those to whom the subject is new, will commence with a few remarks, chiefly explanatory of terms which I shall have occasion to use, and without which I cannot make my meaning clear, and shall conclude with a short account of the *modus operandi* employed in my dissections, with a view to encourage those who might wish to follow them out, but who may possibly be deterred by over-estimating the difficulty of so doing.

When two different creatures are compared, and certain parts in the one are found to correspond with, and to take the place of, similar parts in the other, then, however different may be the office they fulfil, the parts are said to be homologous, and the one part is said to be the homologue of the other. Thus, the arm of a man and the wing of a bird are said to be homologous parts, and also in the insect before us, the balancers which take the place of the second pair of wings in such as have two pairs, are said to be the homologues of that second pair.

The use of the term "plate," as applied to designate a portion of the integument of insects, should be well understood. It is not intended to indicate any separation of parts. It is important to bear in mind that the integument of insects forms a continuous covering in which no break can be found, over every part of the creature. Certain parts are, however, strengthened by the deposit of a horny substance, called *chitine*, and these are more or less distinguishable as plates, from the intermediate soft and transparent portions which connect them with one another. An examination of the abdominal plates of a fly or a beetle will best illustrate this.

Each of the parts of the mouth of an insect being a hollow organ has an external surface or plate, and an internal ditto. Those belonging to the labium have been recognized respectively as the mentum and the posterior labial plate, or floor of the mouth, mentioned by Mr. Lowne.* I have not seen any similar distinction in the case of the labrum, but shall introduce it for the purpose of my description, calling *a* the external plate of the labrum, and *b* the internal plate of the same, the latter being also the part referred to as the roof of the mouth, as opposed to *b'*, its floor.

With reference to the salivary duct, of which mention will hereafter be found, I should say that the saliva of insects is an acrid juice, secreted by special glands situated in the thorax, and emptying their contents by appropriate ducts either into the cavity of the mouth, or into the commencement of the stomach. Its penetration into the wound is the cause of the irritation produced by the bite of various insect-pests, with which we are all familiar. It only remains for me to add that if the head of the insect be cut off and placed with the antennæ uppermost, that surface of the head which bears the antennæ will be the superior surface; the use of the terms inferior, anterior, posterior, and lateral will not need further remark.

The head of the Crane-fly consists of a somewhat globular chamber bearing the great compound eyes and the antennæ, from the fore part of which arises a cylindrical prolongation which I recognize as the rostrum described by Burmeister,† and stated by him not to form a distinct organ, but to be merely a continuation of the corneous covering of the head. The parts of the mouth or trophi, as they are sometimes called, which form the subject for our present consideration, are situated at the extremity of this rostrum; some of them are, however, prolonged internally some distance into the head. They are as follows, viz:—

I.—The labrum, consisting of—
1. An external plate.
2. An internal do., forming the roof of the mouth.

* Such references to this work as require an acquaintance therewith I shall insert in the form of notes, which may be disregarded by the general reader.

* Lowne's "Anatomy of the Blow-fly," p. 47.
† Page 51, Shuckard's Translation, 1836.

II.—The labium, consisting of—
1. An external plate or mentum.
2. An internal do., forming the floor of the mouth.
3. A plate attached to the anterior border of the last named.
4. A pair of lobes.

III.—The maxillæ and their palpi.

In addition to these I must notice a fourth organ, viz., the pharynx, concerning which I am somewhat

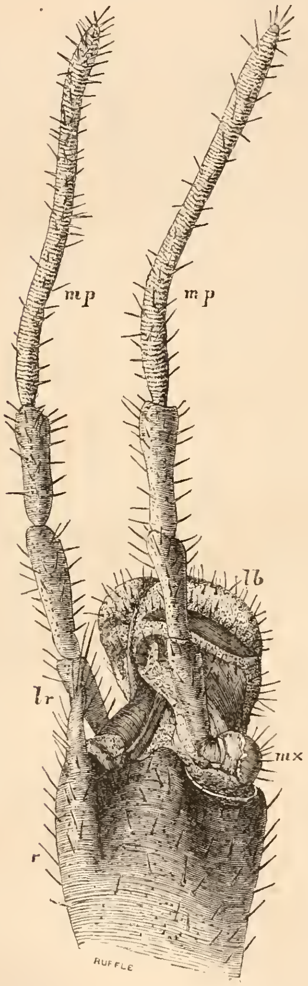


Fig. 97. General view of mouth organs of Crane-fly, × 24—*r*, *rostrum*; *lr*, labrum; *lb*, labium; *mx*, maxillæ; *mp*, maxillary palpi.

doubtful whether it can properly be regarded as a portion of the mouth and not rather as the distended commencement of the œsophagus. I find it, however, difficult to persuade myself that it is not the homologue of that which Mr. Lowne has described under the same name as forming part of the basal joint of the proboscis of the Blow-fly, and shall therefore include it in my account of the mouth organs here.

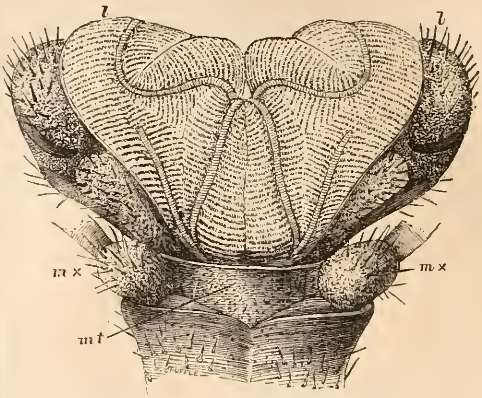


Fig. 98. The labium from beneath, × 48—*ll*, the lobes; *mx*, maxillæ; *mt*, mentum.

Fig. 99. One of the main false tracheæ, with branches, × 210.

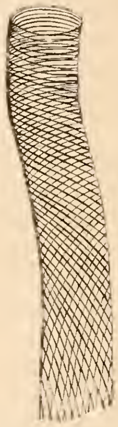


Fig. 100. Terminal portion of salivary duct, × 210.

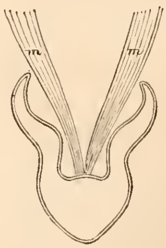


Fig. 101.

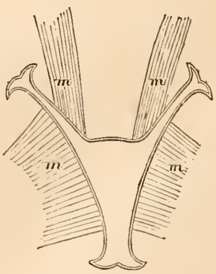


Fig. 102.

Fig. 101. Anterior section of pharynx (the lettering in this and following figs. indicates the position of the muscles) × 90.

Fig. 102. Posterior section of ditto, × 90.

It will be noticed that the above enumeration does not include, 1st, the mandibles; 2nd, the paraglossæ; 3rd, the labial palpi; and 4th, the tongue.

The mandibles are either not present or are very obscurely represented, as will be noticed further on. The paraglossæ are, I believe, to be recognized under

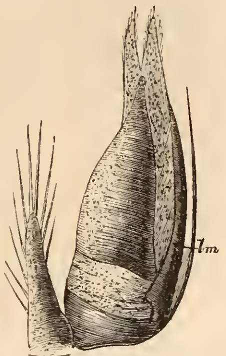
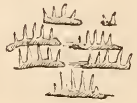


Fig. 103. Labrum from beneath, × 48—*lm*, lobes of maxillæ.

Fig. 104. Side view of ditto, × 48.

above parts in detail and in the order indicated, taking first—

I. The labrum, which consists externally of a triangular horny plate terminated in front by two fleshy pointed lobes; it is situated immediately beneath a snout-like process in which the rostrum.



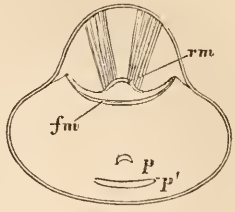


Fig. 107.

Fig. 108.

Fig. 107. Group of minute spines from terminal joint of palpi, × 210.

Fig. 108. Section of Rostrum in line shown by fig. 106, × 24—*rm*, roof of mouth; *fm*, floor of ditto; *pp*, processes attached to lobes and mentum respectively.

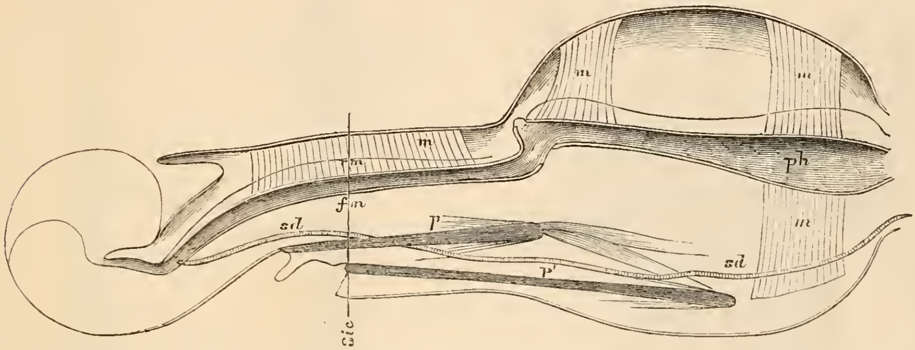


Fig. 106. Longitudinal section of head and mouth, × 24—*ph*, Pharynx; *sd*, salivary, duct;—rest of lettering as before.

the altered designation of the lobes, though I have not seen this formally so stated, and shall be glad to be confirmed in my opinion if correct. The labial

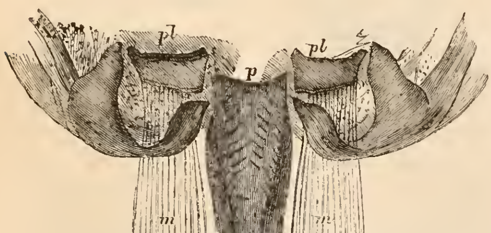
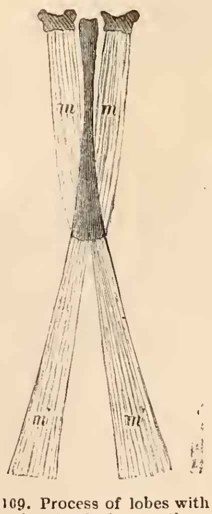


Fig. 105. Articulation at base of lobes, × 120, *p* process; *pl*, plates to which muscles are attached.

palpi and the tongue are absent, unless a minute projection in the floor of the mouth, where the salivary duct enters, may represent the latter organ.

I will now endeavour to describe each of the



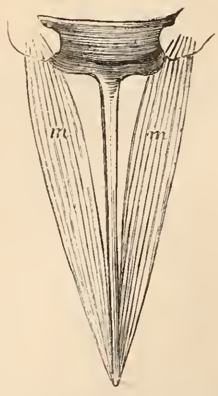


Fig. 109. Process of lobes with muscles attached—*mm*, those connecting it with back of head, × 24.

Fig. 110. Process of mentum with muscles attached to maxillæ, × 24.

terminates above, with the anterior edge of which it is connected by a membranous band which allows it some freedom of motion. The internal plate of the labrum which forms the roof of the mouth is connected in front with the part just described, but is prolonged behind almost the whole length of the rostrum; it is grooved longitudinally along the centre of the groove forming a cavity which can be greatly enlarged by the action of two muscles which arise one on each side of it for a considerable distance and are inserted above in the integument of the rostrum. The lateral portions of this plate which are connected with the floor of the mouth are very thin and yielding, thus allowing easy play to the action of the muscles in question. A pair of slightly curved and horny rods are developed in the membranous integument, one on each side of the external triangular plate, which I suspect to be portions of the maxilla.* A few sets arranged in pairs may be noticed between them.

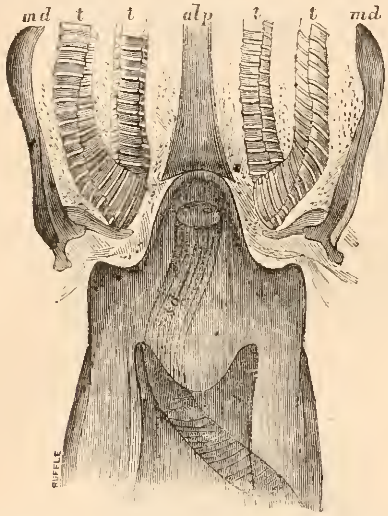


Fig. 111. The opening of the mouth, × 120—*alp*, anterior labial plate; *t t t t*, main false tracheæ; *md*, rudimentary mandibles.

II. The labium is the most complicated of the organs of the mouth, and consists, as before stated, first of the mentum. This is a somewhat quadrangular plate attached to the lower anterior border of the rostrum, its anterior edge being connected with the base of the lobes. Its posterior border is thickened and produced into a long slender rod, which passes far back into the base of the head and gives origin to a pair of muscles which proceed to the maxilla. A slight inversion of the integument occurs between the rostrum and the mentum and again between this last and the base of the lobes.

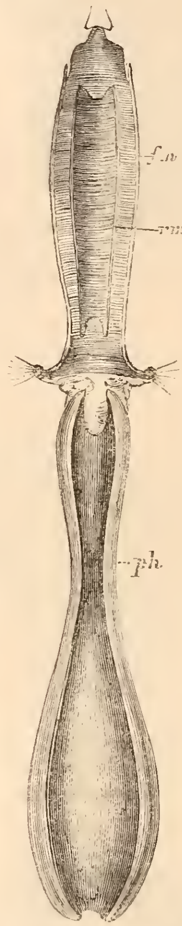


Fig. 112. Pharynx and mouth cavity from above—lettering as before, × 24.

Fig. 113. Anterior labial plate, × 210.

The floor of the mouth,* which is opposed to the roof of the same before described, is almost wholly included within the rostrum, along the whole length of which it extends. A transverse section of it is somewhat crescent-shaped, the concavity being uppermost. It is deeply channelled at the anterior portion,

* Those who have read Mr. Lowne's book on the Blow-fly, will remember that he describes a portion of the maxillæ as united with the labrum, and he further says that the portions so united are clearly the homologues of the terminal lobes of the maxillæ in bees, the lobes referred to being those marked *mx* in his drawing of the maxillæ and labrum of a Carpenter Bee, at p. 229 of SCIENCE-GOSSIP, in the number for October last. If this is the case, I apprehend that in the insect before us also the terminal lobes of the maxillæ may be represented by the curved rods referred to in the text, the remainder of these organs being recognizable in the stout basal pieces from which the four-jointed maxillary palpi spring.

* I believe this to be the homologue of the posterior labial plate described by Mr. Lowne at p. 46, though its connection with the mentum is not so clear as in the Blow-fly, inasmuch as the greater portion is internal, being entirely inclosed within the rostrum.

where it abuts on the part to be next described, and at the posterior extremity it is broadened and turned upwards, the two posterior corners forming knobs for the attachment of muscles. The anterior portion is united to the upper side of the mentum, and it is connected behind by a short membranous tube to the pharynx. At its anterior extremity, a minute eminence marks the surface of the salivary duct, and is the only representative of the tongue I can detect. This duct extends as a single tube through the head at the base of the brain, after which it divides, and leads to two small salivary glands situated in the thorax; it may easily be mistaken for a tracheal tube, but the rings are not so regular and perfect as in the latter, and near its extremity they assume a longitudinal instead of a circular direction.

Immediately in front of the floor of the mouth is a narrow thin plate,* which marks the line of division between the lobes; it is the third portion of the labium as above enumerated, the fourth and last being the lobes themselves. These are attached above the plate just mentioned, and are connected below with the anterior edge of the mentum. Their external surfaces are of a thickened miscellaneous texture, strengthened by a thick clothing of fine hairs, between which are interspersed others of a much larger size, and furnished with bulbous roots. A pair of narrow horny plates extend across them about the centre of their length, from the superior to the inferior surface; immediately behind which is another larger pair of a somewhat triangular shape, the posterior angles of which are connected by a complicated articulation with a handle-like internal process, which arises from the junction of the mentum with the base of the lobes. These parts together form a protective covering for the more delicate structure which ordinarily lies folded up between them. When expanded, however, this is seen to be a membranous sac, ornately marked with a fine tracery of false tracheal tubes; it is the essential feature in this part of the organism, not perhaps so elaborate in its details as that of the Blow-fly, but nevertheless forming a very beautiful and instructive object for microscopic display. The false tracheæ, as they are called, are deep-channelled folds in the transparent membranes, kept open by incomplete rings, which differ from those of the Blow-fly in being perfectly plain, instead of, as in the latter insect, forked at either end alternately. Four main channels arise immediately in front of the floor of the mouth, two on either side, and, gradually decreasing in size, take a sinuous course over the bladder-like membrane; from these a great number of smaller similar channels diverge at right angles, covering the whole surface of the organ, and forming a fine strainer, through which the fluid element of the insect passes on its way to the mouth. A pair of small chitinous hook-like thickenings of the integment, may be seen in front of the floor of the mouth, one on each side the origin of the false tracheæ, which are, I believe, the homologues of similar hooklets, which in the Blow-fly Mr. Lowne thinks may represent the mandibles.* The articulation of the base of the lobes with the anterior edge of the mentum presents several complicated parts which I have not been as yet able fully to understand; but the following may I think be made out. A stout handle-like internal process is borne by the base of the lobes between the posterior lateral plates, immediately over the slender rod-like process of the mentum before mentioned, and between it and the floor of the mouth; it is not so long as the process of the mentum, but like it, serves for the insertion of muscles, a pair of which are attached to its posterior extremity, and connect it with the back of the head: these seem to be retractors of the mentum and lobes, but how the converse movement of their protrusion is effected, I am unable to suggest. Another pair of muscles directed forwards are also attached to the posterior extremity of this process, and connect it with two small plates on either side of its anterior extremity, which form part of the complicated articulation above alluded to.

III. The maxillæ, and the maxillary palpi, wil next claim our attention. The former are, I believe, represented by two stout joint-like pieces on each side of the mentum from which the four jointed palpi spring. I confess it was some time before I could understand these organs at all, and I feel I must even now speak diffidently on the subject. If the reader will turn again to Mr. Lowne's description of the mouth of the Carpenter Bee in the number for Oct. last, he will find the maxillæ of that insect described as follows:—"Each consists of a large outer knife-shaped lobe *mx*, strengthened by a prominent rib along its inner margin; of a small inner lobe densely covered with sensory hairs *mxr*; of a basal sheath *mxb*, and a rudimentary palpus *mxp*." Now I think that the minute horny rods before alluded to as existing in the integument on each side of the labrum in the fly, are homologous to the more highly developed and "knife-shaped lobes" of the maxillæ of the bee; that the joint-like basal pieces of the fly are the homologues of the "small inner lobes," and the "basal sheaths" of the bee, the palpi, which are so enormously developed in the former insect, being reduced to mere rudiments in the latter. My reasons for this opinion have been already alluded to when speaking of the labrum, and I will only now ask the reader to accept this explanation in default of a better.

* I think this is the anterior labial plate of Mr. Lowne. (See p. 47.)

* Lowne's "Anatomy of the Blow-fly," p. 47.

The maxillary palpi originate from the maxillæ just described. They are very prominent objects, being relatively much larger than the same organs in most other insects. They are directed forwards and slightly upwards, and consist of four joints each, the last being nearly as long as the three first together, and of a more membranous character; it is covered with minute chitinous spines, arranged in groups of four or five. I suspect that in these terminal joints of the palpi, the chitinous substance is imperfectly deposited, only occupying the centre of each cell, where it assumes the form just stated, and leaves the edges transparent, thus giving a somewhat membranous appearance to the joint.

The pharynx is the last of the organs with which I have to deal. It is connected by a short membranous tube with the cavity of the mouth, and extends through the brain to the back of the head, where it is continuous with the œsophagus.* A section near the fore part shows a double wall, or, as I prefer to regard it, one continuous integument bent in upon itself on the upper surface, thus forming a deep groove, from the bottom of which a pair of muscles arise which are inserted above in the integument of the head between the eyes. The posterior portion, however, exhibits a section materially modified, which somewhat resembles the letter Y, the extremities of which are curiously folded over. The horny substance being thin and yielding along the line of the folds, allows of the central cavity being very much enlarged by the action of four muscles, two of which corresponding to the two already alluded to on the anterior portion, arise from the superior groove or fork of the Y, and are counterbalanced by two others arising from the lateral portions of the same, all four being inserted in the integument of the head. The main design of this arrangement is, I think, obvious, though I cannot state it in detail. The (perhaps alternate) action of the muscles attached to the pharynx and the roof of the mouth, evidently effects the ascent of the fluid aliment upon which the insect feeds, the propulsion of which into the œsophagus is brought about by the elasticity of the walls of these two cavities.

With regard to the *modus operandi*, I would observe, in the first place, that a sufficient number of specimens should be obtained,—thirty or forty will not be found too many, as some will probably be spoiled in first efforts, before much is learnt from them. When the object is large, it may be pinned to a loaded cork at the bottom of an empty sardine box, improvised as a dissecting-trough, as advised by Mr. Gedge (see S.-G. for August, 1866), and filled with water just sufficient to cover the object. It this be too small, however, as in the present case, to admit of the use of pins, it will be better to place it in a shallow cell or even in a drop of water on the surface of a slide.

The magnifying power employed need not be very great; for most purposes I have used a lens removed from an old telescope, but where greater amplification is needed, I have used the inch objective of my microscope, which answers the purpose very well. A few specimens should always be examined in a fresh condition just killed, which is easily done by placing them for a few seconds in spirits of wine. When this cannot be done, they should be allowed to remain in the spirit for the purpose of preservation; the appearance of the tissues however is much altered, and by no means improved by the process. For examining the integument it will be frequently desirable to soak the insect for a few days in liquor potassæ to remove all the soft parts. Sections should be made in different directions, and the parts teased out with needles; any skill which the operator may possess in drawing should be freely made use of to delineate each portion as soon as it is satisfactorily made out; indeed, some effort to do this is indispensable in order to retain information once acquired, or to communicate it to others. If any further requisite be necessary, I can only sum it up in two words—"patience" and "perseverance." A. HAMMOND.

4, *Neptune Terrace, Sheerness.*

* This connection of the pharynx with the cavity of the mouth on the one hand, and with the œsophagus on the other, together with its evident similarity of function, induce me to regard it as the organ described by Mr. Lowne under the same name in the Blow-fly; but I find it difficult to understand how it is, that while in the insect just named it is closely connected with, and indeed described by that gentleman as forming part of the basal joint of the proboscis,—viz., the third or maxillary segment; in the insect before us it seems totally disscvered from any such union, occupying as it does the globular cavity of the head, and far removed from the maxillæ altogether.

MICROSCOPY.

MOUNTING IN GLYCERINE JELLY (p. 88).—Though I have sometimes found this medium useful for small objects without a cell, with larger ones and cells I cannot speak so well of it. The jelly, after a year or so, shrinks, bending the covering glass, and if the mount is of any size, the jelly is apt to crack, unless air can get in at the side. I lately had to turn upwards of a hundred slides out of my cabinets through this fault; fortunately I had been cautious enough to mount only a few, and only common specimens.—*E. P. P.*

A PROBLEM IN MOUNTING (p. 89). — I have not unfrequently seen the phenomena Mr. Laing speaks of, and, like him, I have watched the apparent air-bubble develop. I once spoke to one of our leading mounters, who told me he had to contend with the same thing, and that sometimes a quantity of seemingly good slides would two days afterwards be faulty. Mr. Laing deserves the thanks of all who occasionally meet with the difficulty, for telling us of the remedy.—*E. P. P.*

Polariscopic Objects.—Having my attention drawn to some crystalline substance attached to the stamen of the white Azalea flower, which I found to be hard and very transparent, I placed it under the microscope, and, from its appearance, I thought it very likely to be a good subject for the polariscope, and so it has proved. On crushing the mass, every particle showed beautiful colours, except at the fracture, which appeared black; I suppose in consequence of the ray of light being refracted by the broken crystals. I then applied a drop of clear water, in which it slowly dissolved, at the same time retaining the brilliant colours until quite dissolved, when it became as colourless as the water. I then placed it under a glass to prevent dust settling on it, and it very slowly again crystallized in beautiful stellated forms in about forty-eight hours. Under the polariscope it produced the most gorgeous colours imaginable. On opening the flower of the Azalea, a drop of very clear saccharine liquor may be obtained; put this on a glass slip without adding water, and it will show the very beautiful crystals in a few hours. On having this substance analyzed, it proved to be perfectly pure sugar.—*James Fullagar.*

A "Life Slide."—Mr. D. S. Holman, of Philadelphia, has recently brought out a "life slide," in which living objects of a certain size can be retained under observation for weeks together. A current of water is made to flow continuously through the chamber containing the object, so that the processes of respiration, circulation, nutrition, &c., as well as the effects of certain poisons, can be studied under perfectly natural conditions. The transparent chamber in which the animal is contained has a fine perforation at each end, too small to allow of the escape of the animal, but sufficient to maintain a flow of water. The latter is effected by means of tubes and glass jars, or reservoirs, on the siphon principle. An illustration of this "life slide" appears in the *American Naturalist* for April.

Structure of the Potato.—Mr. T. Taylor has recently shown that the vascular bundles in a potato may be easily seen by cutting a potato in two through its axis (the section also passing through some of its "eyes"), and coating the cut surface, first with a solution of bichromate of potash, and afterwards several times with a strong tincture of iodine, which will stain the starch blue, but leaves the vascular bundles yellow. The air-ducts will then be seen to extend invariably to the eyes. For microscopical study these sections are to be made and treated with a strong acid or caustic alkaline solution, which will dissolve the starch, but leave the bundles unaltered. The sections may then be mounted as usual. To isolate the vascular bundles, place a potato, skinned without wounding the "eyes," in a solution of sugar and water (two ounces to the pint) and keep it at a temperature of 72° F. for nearly a fortnight. The fungus of fermentation will reduce the potato to a pulp, except the vascular bundles, which may be mounted in gum or balsam, and studied with a power of one hundred diameters.

ZOOLOGY.

Argas reflexus.—This arachnid is the *Ixodes marginatus* of Fabricius, *Rhynchoprion columbæ* of Hermann, and *Argas reflexus* of Latreille,—not Arg*u*s, which is a genus of Phasianidæ, as inadvertently printed in your last number. How truly the specific name of "marginatus" applies, is well shown in Mr. Fullagar's drawings. And it is noteworthy that these are the first engravings ever published of Argas in England, and that they are far better than any to be found elsewhere; facts surely creditable to the author as well as to Science-Gossip. It seems curious that, after this Canterbury *Argas* had been submitted, year after year, to all the most eminent experts in London, it should be left to the perseverance of Mr. Gulliver, jun., with the aid of Professor Westwood, to establish this species as new to Britain, though well known on the Continent. From all that appears, *Argas reflexus* is harmless; yet *Argas persicus*, which lives in houses in Persia, is said to be a dreadful creature, occasioning, by its puncture in the human subject, convulsions, delirium, and even death. Now the Canterbury Argas has been so well engraved and described in Science-Gossip, probably the same species will be found and recognized in other British localities.—*E. R.*

"Utilizing" Poisonous Snakes.—Probably no more ingenious method of committing murder was ever devised than one which is not unfrequently resorted to by the natives of Bengal. As it is, I am sure, new to most of the readers of Science-Gossip, and will have a ghastly interest to all, I will briefly describe it. There is in that part of India a class of gipsies, who are well known to be skilful snake-charmers. To one of these men the would-be murderer applies, and in return for a trifling fee is speedily furnished with a living cobra. In order that he may be enabled to handle the venomous creature with safety to himself, it is secured in the following manner:—"A bamboo is cut from the jungle of the length required, of course as long as the cobra. Then the creature is shoved in, with its head just appearing at one end and its tail at the other. The tip of the tail is then turned up and tied to the bamboo." The murderous weapon is now complete and ready for use. Armed with his cobra-stick, the murderer creeps softly to his enemy's tent in the dead of night, cuts a hole in the wall and pokes in the deadly weapon. The tortured reptile, careless upon whom it wreaks its animosity, strikes its fangs into the sleeper, then is withdrawn, and the murderer steals away as softly and silently as he came. My authority for the foregoing account is unimpeachable.—*John Landels, Kirkcaldy, Scotland.*

The Manchester Aquarium.—A new aquarium, well stocked with marine and fresh-water fish, has recently been opened at Manchester. The sea-water is brought by train in barrels from Blackpool, a distance of about forty miles, and a constant supply is maintained.

Cuckoos and their Young. — A letter in Science-Gossip either last year or the preceding one, mentioned the writer's surprise, on searching for a newly-laid cuckoo's egg in a nest she had just left, to find one on the point of hatching. He expressed his belief that further observations might prove the cuckoo not such a careless parent as she seemed. I was in a market-garden lately and remarked to the owner that cuckoos seemed very plentiful this year. He told me that he frequently saw the old cuckoos perching on his espaliers with their young broods; that they would sit so still as to be more like stuffed birds than live ones, and then they would drop down suddenly, pick up a dew-worm and feed a young one, and again repeat the process. This he spoke of as a common event. I told him that it was not a generally well-known one, and asked if he would object to its being named on his authority, as it might bring questions upon him. He does not object; therefore I mention his name and address,—*Mr. Jerome Delicate, Redworth, Heighington, Darlington.*

Arrivals of Migratory Birds.—Nightingale, April 9th; Cuckoo, April 19th; Swallow, April 25th; Corncrake, April 30th. — *T. P. B., Wrotham, Kent.*

BOTANY.

Geum rivale (p. 137) is given by Mr. Watson ("Topographical Botany," p. 139) as a plant of West Sussex, on the authority of Mr. Borrer.—*James Britten.*

English Plant-names.—May I draw the attention of the readers of Science-Gossip to the fact that Mr. Holland and myself hope to publish Part I. of our "Dictionary of English Plant-names" during the present year? Any names will be thankfully received by *James Britten, British Museum, W.C.*

Saxifraga granulata.—*Apropos* to the discussion raised in your columns upon the root of *Saxifraga granulata*, I may mention that I found the other day, near Winchester College, a specimen with a string of the so-called bulbs attached to the stem by a small rootlet, reminding me somewhat of the root of *Lathyrus monorhizus* (*Orobus tuberosus*).

Singular Growth of Willow-trees. — I am not aware that any one has noticed in print a curious way in which young willow-trees are sometimes produced. In marshes near Northfleet, where there are a number of these trees that have been scooped out by the labours of the Goat caterpillar, and the diligent jaw-work of smaller insects that have followed, the empty space in the interior by degrees in several of these has been partly filled by a stratum of mould, formed of dead leaves, &c.; and into this some of the ripe seed-pods falling, have produced sapling willows, which have sprung up to a good height within the parent tree, the outer shell of which still retains its vitality, and puts forth leaves, if not blossoms, as when in its healthy condition.

Raphides and Cuticles.—Use of Potass in Phytotomy. — No wonder your correspondent "G. H. J.," in Science-Gossip (No. 114, p. 141), has to ask questions on such simple and useful matters as the separation and display of plant-crystals and cuticles, for, as regards the subject of histological phytotomy, especially on these very points, our late treatises are by no means up to the present state of knowledge. The old works of Raspail, Lindley, and Hutton Balfour have more accurate information on such subjects than is to be found in our most recent and loudly-praised botanical works. As to the severance of the cuticles from their connections, and exposure of raphides, short crystal prisms, and sphæraphides, the best plan is to boil the leaf or other part for a few minutes in a solution of caustic potass; then transfer the vegetable texture to a pan of pure water, and separate or teaze out the cells, membranes, fibres, and other parts by means of needles. Delicate manipulation, which a phytotomist so earnest as "G. H. J." will soon learn, may then be very effectually employed, and with surprisingly satisfactory results. The liquor potassæ of the Pharmacopœia will answer well, either pure or diluted. Professor Gulliver showed experimentally, at a scientific meeting of the East Kent Natural History Society, Oct. 2, 1873, how admirably this procedure answers with the short prismatic crystals in Leguminosæ, and with the sphæraphides and cuticle of the leaf of the fresh tea-plant (*Thea viridis*), as noticed in his memoirs in the *Monthly Microscopical Journal*, December, 1873, and elsewhere. For any account of plant-crystals, like that given by him, with wood-cuts, in SCIENCE-GOSSIP, May 1, 1873, the botanist might look vainly into any of the most recent and popular books which are put into the hands of our pupils. But with the aid of potass, which may be safely boiled in a German glass test-tube over a spirit-lamp, and the subject ventilated and popularized in SCIENCE-GOSSIP, we may expect to promote a better knowledge than is at present current in this country of minute phytotomy.—*Q. F.*

ARTEMISIA CÆRULESCENS (p. 136).—No wonder that your correspondent (K. L. Grey) has not been successful in finding any description of *Artemisia cærulescens* in "ordinary botanical books." Its last public appearance as a "wild shrub" was, I believe, in the "English Botany" of Sowerby and Smith, where we are informed (No. 2,426) that Tofield had "assured Hudson that it grew wild near Boston, in Lincolnshire." Gerarde had long before also told us that in his days it occurred as a native in the Isle of Wight and some other places; but there can be little doubt that this was an error in both cases, and I am not aware that any other botanist has ever even professed to have met with it in the wild state; neither does its Continental distribution favour the possibility of its being indigenous in Britain. The Artemisia seen by your correspondent growing in such abundance close to the sea, was in all probability *A. maritima*, which is common enough in appropriate localities throughout the English coasts, and is also found, although more rarely, in Scotland. Babington, in his "Manual," gives a variety, the *salina* of Willdenow, with the flowers in unilateral racemes, which is perhaps the especial form intended by the writer of the notice. Between *A. cærulescens* and *maritima* there is no resemblance whatever.—*R. A. Pryor.*

LINNEA BOREALIS.—It may interest some of your readers to know that the above interesting little plant is growing vigorously and now flowering in our woods at Stanmore.—*E. Brightwen.*

SEASIDE SHRUBS (ATRIPLEX HALIMUS, &c.).—The notice in the April number of SCIENCE-GOSSIP on this shrub was written in ignorance of its having already been introduced on our coast and in Jersey as a seaside shrub. It appears, however, from A. Morley's statement in the June number of SCIENCE-GOSSIP, and in the May number by "I. I. M.," to be used for hedges not only in St. Brelade's Bay, Jersey, which is a sheltered spot, but is "found on a very elevated embankment (in the island) to protect the lower portion of a garden, where nothing but the alder will grow." A. Morley adds: "I have also noticed that it is being introduced into other parts of the island for forming thick low hedges between cornfields." K. Lilley Grey also informs us, in the June number, that it is "growing in hedges at St. Leonards, and seems to flourish well on the Hastings sandstone." In the newly-planted ornamental ground fronting the sea, on the West Brighton Estate, may be seen an embankment of earth raised to protect the shrubs and plants from the strong winds, with a dwarf dead furze fence on the top of the embankment, giving it an unsightly appearance. If, instead of the dead furze, the *Atriplex halimus* were planted thickly on the embankment, it would speedily grow to a dense hedge, and form a screen, which would be a durable and pleasing object. The shrub is not only adapted for the seaside, but in the south of France it thrives inland, and would be found in England a good protection in all exposed spots by sea or elsewhere. Neither of the notices above referred to gives any information as to its growth—whether it is slow or rapid, and whether the leaves are at all affected by the strong sea-breeze. As it is almost a stranger with us, any information on the subject by those who have observed its characteristics would be very acceptable to persons who may be desirous of cultivating it. I may here observe that the plan of an embankment (say about three feet high), with the Atriplex planted upon it, might be adopted with advantage on the Undercliff road at Brighton. When the shrub becomes better known, no doubt it will be extensively cultivated, not only as being ornamental, but as a protection or screen. Many of your readers must be able to add to the list of shrubs enumerated or referred to in recent numbers of SCIENCE-GOSSIP as suitable for seaside planting. Any information on the subject would greatly forward the object many have in view regarding their cultivation. It is probable that the *Juniperus communis* and the dwarf variety, *J. nana*, might succeed well as ornamental evergreens. Can any of your readers say if they have been tried by the sea, and where? They grow in the mountains in Wales, Scotland, and Ireland. Withering says the *J. nana* grows on the higher mountains of Scotland, and is abundant in the outer Hebrides nearly as low as the level of the sea. The *Juniperus prostrata* was growing many years ago in Brighton; it is a handsome evergreen, and likely to succeed by the sea, being prostrate, with horizontal branches spreading on the ground like the Cotoneaster. The French cultivate the *Juniperus Sabina* under the names of *J. compressifolia* and *J. tamariscifolia*, male and female. (See *Bon Jardinier.*) They resemble the *J. prostrata* in character and appearance, and would most probably succeed by the sea. They are abundant in Switzerland, on the road between Loesche la Ville and the Baths of Loesche at the foot of Gemmi Pass.—*W.*, *Brighton.*

GEOLOGY.

ON THE LAST STAGE OF THE GLACIAL PERIOD IN NORTH BRITAIN.—This was the subject of a paper recently read before the Geological Society of London, by T. F. Jamieson, F.G.S. In this paper the author arranged the Glacial phenomena of Scotland under the following three heads:—1. The great early glaciation by land-ice (maximum effects of glaciation). 2. The period of glacial marine beds containing remains of Arctic mollusca, when most of the country was covered by the sea. 3. The time of the late glaciers, the special subject of the paper. After expressing himself in opposition to the hypothesis of a great polar ice-cap, the author described this last period as one not of mere local glaciers, but as characterized by a return of a great ice-sheet over nearly the whole of Scotland and Ireland; but he stated that this ice-sheet was probably neither so thick, so extensive, nor so enduring as that of the first period of glaciation, which cleared away everything in the shape of superficial deposits down to the hard rock. He believed, however, that in the last period the mountains of Scotland and Wales, as well as the Pennine range and the rest of the north of England as far as Derby, were covered with thick ice, which in most parts reached down to the sea, and that extensive snow-beds prevailed over the rest of England. In the summer months the melting of these would give rise to streams of muddy water, and produce the superficial deposits of Brick-earth, Warp, and Loess; whilst, when the currents were stronger, perhaps from the thaw being unusually rapid, deposits of gravel would be formed. This second ice-sheet would gradually become less and break up into valley-glaciers, which in their retreat would leave kaims and eskers at low levels, and moraines in the mountain glens. During this time no new great submergence of the country took place; and the last great modifications of the surface were subaërial, and not submarine, the work having been done by frost, rain, and glaciers. In the discussion which followed, Mr. Jeffreys considered that the author's remarks relating to the beds containing Arctic species of mollusca were not quite correct. *Pecten islandicus* has been found in the drift of Scotland, but not in the seas at present surrounding that country. At depths of 30 or 40 fathoms many arctic shells in a semifossil state have been dredged, although they do not now live in those waters. *Mya truncata*, a species which lives in very shallow water, has been found in much deeper water in a semi-fossil state. At Fort William there is a bed containing arctic species of shells 7 or 8 feet above the level of the sea. Arctic shells of deep-water species have occurred 200 feet above the sea. Different conditions have existed at different parts of the same seas, altering the character of the mollusca. The raising of the sea-beds above the level proper to enable certain mollusca to flourish, would cause them to become extinct. Dr. Carpenter mentioned that cold water may be thrown up into very small depths under certain circumstances. Near Halifax, N.S., the surface-water is tolerably warm, but at no great depth the temperature falls to 35° F. In this case the rotation of the earth causes the cold water from the north to surge up on its western coast. The North Sea is a shallow sea, with a shoal in the middle, and having off the coast of Norway a deep channel which conveys the cold arctic undercurrent; hence the east side is 10° F. colder than the west side. Local peculiarities of disturbance of temperature may thus occur within short distances. Prof. Ramsay remarked that the author was not dealing with wide ocean deposits, but with ice coming down to the sea from the land. He had described certain changes,—a great glacial period, a period of submergence, and a second minor glacial period. Mr. Prestwich maintained that temperature was a most important question in connection with the subject of Mr. Jamieson's paper. The glacial deposits were not formed in deep sea, but in shallow water with shore temperatures. He thought that the paper was very speculative, and remarked that the evidence upon which the opinions expressed were founded was not always given.

GEOLOGY OF CLEVEDON.—In answer to your correspondent "K. L. G." in the May number of SCIENCE-GOSSIP, I beg to state that all the "Red rocks" of Clevedon, and of the Mendip Hills and the Bristol district, belong to the Keuper, or Upper Triassic series. These rocks include the Dolomitic or Magnesian Conglomerate, Red Marl, Sandstone, and occasionally Magnesian Limestone. There are no rocks of Permian age in Somersetshire, and the introduction of this name into the county, which has been given in several local pamphlets and guide-books, is due to a misunderstanding of the term Magnesian, as applied to the Dolomitic Conglomerate: it is merely indicative of the matrix or cementing material, and is not used as a mark of age, as with the Magnesian Limestone (Permian) of the northern and midland counties of England. The relation between the various divisions of the Red rocks themselves is not altogether one of lithological succession, such as is often given in text-books; namely (in descending order), 1. Marl, 2. Sandstone, 3. Conglomerate. Each of these divisions, as well as the Magnesian Limestones which are seen at Clevedon, also near Bristol and in Glamorganshire, may and do occur anywhere in the Keuper series. The whole history of the Triassic rocks from the oldest beds in South Devon (and some of them are very likely older than the Keuper) shows that Marl, Sandstone, and Conglomerate, or Breccia, were deposited at all horizons, one replacing another in horizontal extension, although at the same time it must be observed that there is a certain tolerably regular and similar succession in the order in which the beds have been locally deposited. This, however, is only what might be expected, the different depths of water and shore conditions being indicated by the sediment deposited. The relations between the Red rocks in East Somerset with the beds above is clearly shown in many sections, the red marls being overlain conformably by the Rhætic beds. In places too, the Dolomitic Conglomerate, which is only the beach deposit of the marls, occurring at all horizons at its margin, is overlain directly by the Rhætic beds. The Red rocks in this district may therefore be satisfactorily assigned to the Keuper division of the Trias. Further south, in West Somerset and Devon, the area may have received deposits during the earlier portion of the Triassic period. Some of the beds have indeed been coloured as Bunter, in the geological maps of Greenough and Ramsay, but as Pengelly and Whitaker have pointed out (and last summer, in company with my colleague W. A. E. Usher, I came to the same conclusion), there is no real break or unconformity between the Rhætic beds of Axmouth and the Sandstones and Breccias of Dawlish and Teignmouth. The whole of these beds might be termed Keuper, but, owing to their great thickness, there is some justification in thinking that the Muschelkalk might be represented, as well as the Bunter, and by sediments of a different lithological character. It is best, therefore, to term the whole development the Triassic series, without making any subdivisions (which would have no value) to correlate them with the divisions made on the Continent. Those who inquire into the literature of the subject will see what little reason there is to see any unconformity whatever in the Triassic series throughout England; but this is a subject too large to be dealt with here.—*Horace B. Woodward, Geological Survey of England and Wales.*

NOTES AND QUERIES.

Snakes and Toads.—*Apropos* of a query in a last year's paper—Do snakes eat toads as well as frogs?—I can relate a case in point. I was stooping over a bed of strawberries intent on fruit, when there emerged above the thick foliage, right under my nose, an enormous head and neck of such strange form that I could not make out what manner of creature it might be. Of course I changed my position rather suddenly; but noticing that the head seemed to belong to one of the snake tribe, I seized a stick and struck it a sharp blow, as it still stood with neck reared above the leaves. To my utter astonishment out flew a medium-sized toad, knocked out of the snake's jaws by the force of the blow! When I came upon the scene, nothing was visible of the poor little victim except his hind feet; all the rest was lodged in the snake's gullet. When I came to examine the toad I had so unexpectedly rescued, I found him alive, but at his last gasp; whether from the effect of my blow, or treatment received of the snake, I can't say. The snake was of the species known here as the "Garter," and was scarcely as large as my thumb. Moral: Snakes *do* eat toads as well as frogs.—*A. F. Dod, Memphis, U.S.A.*

Geology of Barnet.—I propose spending my three weeks' holiday this summer at Barnet, and shall be much obliged for any information concerning the geological characteristics of the neighbourhood, and hints which may be of use in my excursions in search of fossils, rock specimens, &c. Is there any book published relating specially to this part of England?—*K. Brierly.*

Molluscan Threads (p. 49).—I am much obliged to Mr. William Harte, F.R.G.S.I., for his courteous communication (p. 117). My experience of the thread-spinning of the slugs is less than of the spinning of fluviatile mollusks, and I spoke too decisively when I said that slugs "do not use it [the thread] as a means of ascent." I ought rather to have said, I have never seen them so use it. Mr. Harte will give me credit for having modified my assertion a little by saying (p. 52) "my observation teaches me," &c. I have not seen Mr. Harte's paper upon the use of the thread, by *Limax arborum*, or I should certainly have availed myself of his very interesting observations; but I am glad he has corrected my error and added to my little store of knowledge upon a subject, the study of which has afforded me much pleasure.—*G. Sherriff Tye, Handsworth.*

Preserving Fungi.—Being desirous of making a collection of "British Fungi," would any reader of the Science-Gossip inform me how to preserve the fungi from shrivelling, rotting, and losing colour?—*L. R.*

Rare Insects and Bad Seasons.—A contributor to Science-Gossip has, in the January number, alluded to the circumstance, that, especially in the order Lepidoptera, in such a year as 1873, when both butterflies and moths were scarce, examples generally turn up of species of particular rarity. Several conjectural explanations have been given of this; and it may, of course, be the fact, that the atmospheric phenomena which are unfavourable to many common species, may be suitable and favourable to others we less often see. But perhaps the explanation lies simply in this, that in a year when there are fewer insects about than usual, we notice more carefully what is abroad, and specimens, which in an average season may be often missed in the multitude of others, come out more prominently when the entomologist is putting very little into his boxes.—*J. R. S. C.*

Unknown Plants.—Will any reader of Science-Gossip kindly inform me of the names of the undermentioned plants; viz.—1. An Orchis, bearing a spike of flowers about ten or twelve inches long, the whole flower green, the lips slightly paler, and divided like a clergyman's band; root cylindrical and fibrous? 2. An Orchis, apparently leafless, the spike of flowers about four inches long, flowers brown and uninteresting, appearing as if scorched by hot sun; found in this neighbourhood, on dry sunny banks? 3. A plant resembling an Orchis in growth, and found in same localities, but bearing a head of flowers upon a stalk about three or four inches high, the flowers about twelve in number, each composed of six white petals, every three lobed, the lower part of the stem bulbous, like a spring onion, but solid instead of being composed of layers; root cylindrical and fibrous, like an orchis. The whole plant smells and tastes very strongly of garlic?—*K. F. L.*

White Beech-leaves.—A friend of mine, whilst taking a walk the other day, was struck with the appearance of a beech-tree, a branch of which had its leaves perfectly white. Thinking that the leaves had withered, he examined them, and found them quite fresh. Never having heard or seen the leaves of a beech of this colour, I thought it worth making a note of. I inclose you a small bit, although I am sorry to say it is not so fresh as when I first saw it. The remainder of the tree was of the normal colour.—*James Bate.*

Jelly on Sea-weeds.—I should be obliged to any of your readers who would tell me the name and nature of the masses of green jelly found attached to various sea-weeds. They are about the size of a pea, and are seen by a lens to be studded throughout with a multitude of minute green globules. The gelatinous substance is nearly structureless under the microscope, merely showing faint signs of striation, and the globules seem to be granulated more densely towards the centre. Their diameter is about the two-hundredth of an inch.—*George Guyon.*

Slugs *v.* Alpine Plants.—I am happy to be able to recommend to "Mary Longhear" a certain way of protecting her alpine plants from slugs. I had been annoyed by these for a long time, and could find no certain remedy. At length I determined to "fortify" the bed, and admit none but such as could "leap the ditch." This fortification I effected to my entire satisfaction by procuring a coil of zinc, which I cut into strips about 20 inches wide, and bent into U form, and buried as an edging round the bed, and kept it constantly *nearly* filled with watêr; and I found that neither slug nor snail ever crossed it, and it was very easy to banish all that happened to be inclosed. I connected this with a fishpond, and it no doubt afforded the inhabitants a source of great pleasure, as they regularly made "excursions round the world," and seemed to benefit much by the liberty given them. In small pots standing in the water I planted several pretty plants, such as *Drosera*, *Pinguicula*, mosses, &c. &c., taking care that no bridges were formed: the effect was very pleasing. I give my address, and shall be glad to exchange further ideas with "Mary Longhear."—*T. MacGann, Burrin, Ireland.*

P.S.—At several potteries they are now manufacturing pots and pans with double sides to hold water between them for the same purpose and to keep up a constant supply of moisture.

Birds and Primroses.—Being very fond of primroses, I have quantities of them growing on the sides of the drive leading to my house, the trees overshadowing which are sacred to blackbirds, thrushes, and birds of all kinds. Each spring I observe that my floral pets are destroyed by hundreds, the flowers being bitten off at their junction with the scape, and usually the germ appears to have been abstracted. Without doubt the blackbirds are the depredators; but why they should do it, and what for, it seems difficult to determine. My own notion is that the Blackbird really eats the germ, as it has a somewhat sub-acid flavour, and in early spring it seems to be the only kind of fruit he can get at. Later in the year he pays too much attention to our strawberry-bed; still we put up with these depredations on account of his fine, vigorous music.—*Jas. Buckman, Bradford Abbas.*

Parrots.—With regard to Mr. Guyon's inquiry about my anecdote of the parrot, I beg to state that the "action was *so* carefully observed as to leave no loophole for doubt that it was designed." Numerous instances of the sagacity of the Parrot tribe might be given, some of which undoubtedly manifest, at least to my mind, the existence of mental faculties, quite apart from those natural instincts with which they are endowed for supplying the more ordinary demands of their being.—*G. O. Howell.*

Moths' Wings.—In answer to the query of your correspondent "S. A. B.," viz., "Do moths fold their wings over their backs as butterflies?" I would remark that all lepidoptera act thus when drying their wings immediately after emergence from the pupa. But when the wings once become thoroughly hardened, this peculiarity is possessed by the butterfly alone, the moth then placing its wings on or around its body. Doubtless your correspondent observed in his captive its excellent condition, another but not so certain an indication that it had just assumed the imago state. It is not unfrequently given as a rule of distinction betwixt butterfly and moth, that the one when at rest places its wings erect over the back, whereas the other wraps them round the body; however, this does not hold good till our friend has made at least one journey through the air.—*Henry A. Auld.*

Destruction of Insects.—I thoroughly agree with your correspondents that something ought to be done to stop the wholesale destruction of insects, &c., that takes place year after year. But what? Some time ago a collector showed me some boxes in which were literally dozens of butterflies, all jumbled together so that they were of no use whatever. His usual plan of collecting was, as soon as he saw an insect to net it, and before looking to see if it was anything he wanted, kill it first and examine it afterwards; so that I should think by the end of a season he must have killed hundreds, and after selecting what he wanted, have thrown the rest away. It is true they were mostly the common sorts, but we know that many butterflies, which are now rare with us, were originally amongst the common ones; as, *C. dispar*, *P. Acis*, and *P. Arion*. Again, in the season of 1872, a swarm of *A. Lathonia* occurred here, and of course there was a rush of collectors after them (I confess I was one). I recollect one day counting fourteen or sixteen nets in one meadow; the consequence was, that last year I did not hear of a single specimen being taken, and the year before I myself knew of over thirty; but most likely there were other captures which did not come under my observation. It was the same with *P. Daplidice* and *V. Antiopa*, several of which were taken here the same year. Now if these insects had been left alone, they would, in all probability, have bred here (for there were both sexes), and so have become regular inhabitants, instead of occasional visitors. The most thorough means of preserving the insects of this land (but not the most probable) would be for all true entomologists to cease from collecting for a few years, say the next six, in order to give those insects which only visit our shores now and then, the chance of settling here, and those which are inhabitants here, but at the same time rare, the opportunity of becoming more abundant; but I am afraid it would be too great an appeal to the self-denial of collectors. Although I catch numbers of insects every year, I don't kill one half of them, for I can generally determine what they are while in the net, and unless they are the sort required, I let them loose. I try to get six of each species in my collection, three of each sex, where there is any difference in the markings, and generally have two or three surplus ones in case of accidents, or for exchange. Perhaps some other of your readers can devise some means for preserving the favourite little insect "the Brisish butterfly." —*J. A. Allchin, Dover.*

Curious Places for Robins' Nests.—Several instances have been recorded this spring of robins building their nests in remarkable places. The following notes from the West of England may prove interesting. At a cottage near Charlton Park, occupied by a shepherd to the Earl of Suffolk, a pair of robins took possession of a hat which was suspended on a ram's horn, fixed in the cottage for such purposes. Here the eggs were laid, and young ones hatched and cared for. Near Dauntsey station, at the house of Mr. Potter, an unused tea-kettle was taken posession of by another pair of robins. These birds also brought up their young ones, and are so tame as to allow Miss Potter to handle and show them. A third pair chose part of the harness left in the stable of Mr. Thomas Hussey, the Manor, Ilchester. The carter found Mrs. Robin determined not to be frightened away, and would allow him to carry her and her home about the stable. The master subsequently gave orders not to have the birds disturbed, and the latest bulletin reported mother and family doing well. — *W. Macmillan, Castle Cary.*

Scirpus lacustris &c. (p. 141). — It is not improbable that *Scirpus maritimus* was the plant observed by "T. W." about Hammersmith and Putney. It still lingers in very small quantities on the Middlesex shore, where it was seen last year near Fulham (*Journal of Botany*, xi. 342), and is found in greater abundance on the Surrey side. I gathered it myself at Putney a few years back, in company with *S. carinatus*, and have also noticed it by a small pond in the grounds at Putney Hill, at a considerable distance from the river. "T. W.'s" other plant would appear to be *S. carinatus*, which occurs in that neighbourhood in considerable plenty on both banks of the Thames. It is generally reckoned to be rather an unsatisfactory species, and is arranged by Hooker, in the "Student's Flora," as a subspecies under *S. lacustris*. *S. triqueter* ("stems acutely triquetrous throughout,"—Babington's Manual) seems distinct enough, and was a Linnean species.—*R. A. Pryor.*

The Tortoise.—Having expressed a wish for some time to possess a tortoise, a relation at the time residing at London procured me one at Covent Garden, May 1st, 1872, and on Thursday, May 2nd, 1872, it arrived, packed in a tin case, something resembling a painter's pot, only with a corner perforated with holes. One reason why I wished for a tortoise was to rid the kitchen of blackbeetles, and the garden of slugs, &c., which it most effectually did. Some time after the tortoise had been with me, I discovered one morning a small egg, perfectly white and rather rough. I was at a loss for a short time to make out from what source the egg came, but I at last had it suggested that it was the tortoise's egg. Many ridiculed the idea. I scarcely thought it could be the tortoise that had been exposed for sale at Covent Garden, and also for some time with me, that had laid it. A short time after the first, a second egg was laid, which I broke, and had a great deal of trouble to do so, it (*i. e.* the shell) was so hard. The inside, as far as I can remember, looked much the same as a very small hen's egg. I gave the first to a friend, who I believe still has it. I now became almost convinced that the tortoise must have laid it. Some time after it was found dead. Of what it died I was, and am now, to a certain extent at a loss to comprehend. I buried it in the garden about the 14th April, 1873, and to-day (the 2nd of April, 1874) I dug it up, in order to see if I could not keep the scales, which are very easily removed from the carapace when the tortoise has been dead for some time. Having dug it up and removed the said scales, I found it had been greatly damaged by rain, &c., so that I determined once more to consign it to mother earth; but putting a brick, or rather letting it fall on the remaining carapace, I broke it up, *i. e.* the carapace. I at once removed it from the earth, and examined the decayed matter in the inside, when to my great surprise I found an egg which, after it had been removed and washed, I found to be exactly like the other two before-mentioned. Now the question arises, Is it usual or a common occurrence for tortoises, away from their natural habitat, to deposit their eggs? I am not certain whether my tortoise was *Testudo Græca* or *Chersina marginata*, though from what E. Halse says in his paper on "The Tortoise and its Skeleton" (Science-Gossip, 1873, p. 129), I should think it was the latter. Perhaps he would throw some light on the egg subject. Of course, there is now no doubt that it was the tortoise that laid the eggs, as I have now found the last in the decaying body of the animal. I shall forward it to the Editor with these notes.—*Charles F. W. T. Williams, C.E., Redland, Bristol.*

Half-aquatic Aphides.—I have observed with much interest the proceedings of some of these insects in the aqua-vivarium, resident on the floating leaves of the Water Crowfoot, where they enjoy a happy immunity from those insatiable enemies which delight to gorge themselves with aphis flesh, nor are they the petted slaves of their self-interested visitants, the ants. A couple of females founded the colony, and two or three generations soon followed. In one or two instances they must have passed from one leaf of the plant to another across the surface of the water, but I could not ascertain how this was managed. A "wet jacket" the little creatures do not appear to mind in the least, being often on the edges of the leaves close to the water; still, when totally submerged, they soon perish. The act of parturition is, seemingly, usually preceded or followed by a casting of the skin.

Mould in Fern-cases.—I think if "F. J. S." would daily wipe the inside of his fern-glasses "dry and bright," he would not be much troubled with mould. I have found this suggestion, for which I am indebted to Shirley Hibberd's "Fern Garden," very beneficial. Should mould still appear, "F. J. S." must arrange for greater ventilation.—*W. R. H.*

Ebonite Cells.—Would any reader who is in the habit of using these tell me the best way of affixing them to the glass slips?—*W. R. H.*

NOTICES TO CORRESPONDENTS.

GEMINI.—It is not at all an uncommon thing for water-beetles to destroy newts and minnows in an aquarium. Indeed, you could hardly introduce a greater pest.

W. H.—The "Geological Magazine" is edited by H. Woodward, F.R.S., &c., and published by Trübner & Co., 57, Ludgate-hill, London.

M. MAXWELL.—There was no inclosure, either of sedges or anything else, in your letter of the 10th of May.

W. A. CLARK.—Your specimen reached us in a bad state. It appears to be *Myosotis collina.*

WYMAN.—A good remedy against house-crickets are the leaves of the eommon rhubarb strewn on the floors of the rooms where they are abundant.

P. BARKER.—"Half-Hours in the Green Lanes" did not appear in form of separate articles in SCIENCE-GOSSIP. It is an independent publication, by the same publisher.

F. M. I.—Your mosses are, No. 1, *Neckera crispa*; 3, *N. complanata*; 4, *Climacium dendroides*; 5, *Thuyidium tamariscinum*; 6, *Polytrichum commune.* No. 2 is a lichen, belonging to the genus *Cladonia.*—*R. B.*

W. B. L.—Your specimens of micro-fungi were both correctly named. The *Puccinea malvacearum* is very common this year on mallow leaves.—*M. C. C.*

GALLS, &C.—The "hop-like" galls on oak, sent us from Corscombe, Dorchester, are produced by an insect called *Cynips fecundatrix*, Hart. The gall is commonly called the "Artichoke gall."—*C.G.B*

H. R. M.—We believe that Dr. Günther and other of our best ichthyologists now consider the Whitebait to be the fry of the Herring. We have not heard of the Whitebait having been found in the Mersey. Doubtless the fry of other fishes are sometimes sold as whitebait.

G. O. HOWELL.—In your query about the shell called the "Bleeding tooth," you say "you believe" it is found on the west coast of Africa. It is important to know the locality in judging without the specimen. It may be a species of *Monodonta.* But the shell to which it most nearly answers is *Nerita peloronta*;—the latter, however, is American.

W. H.—The fragment of leaf sent probably belongs to a *Myosotis*, whose surfaces are usually covered with whitish hairs, around the bases of each of which are clusters of pearl-like beads similar to those so beautifully shown in your specimen. These pearly clusters are always seen best in the dried leaf.

A. K. HASTELL.—The plant sent is the Lamb's Lettuce (*Valerianella olitaria*).

WILLIAM JENNINGS.—You had better consult Juke's "Manual of Geology," edited by Prof. Geikie. You will there find the best account of the mineral changes through which the granites and metamorphic rocks have passed.

L. S.—The "excrescences" on the leaves of the hazel are evidently the webs of the Processionary Moth.

F. W.—1. *Lepidium campestre*, a very common plant. 2. *Sagina apetala*, a perfect weed in garden walks, &c. Bentham unites this species with others, under the name of *S. procumbens*, L. 3. *Geum urbanum*? too small and imperfect for recognition.—*J. F. R.*

G. L. H.—You are quite correct about the genus, it is *Lotus siliquosus*, the Winged Pea, a South European species.—*J. F. R.*

G. C. D.—Your specimens are—1. A young seedling fern, probably *Lastrea spinulosa* 2. Quite correct, *Orchis Morio*, but there are several other orchids (British) with what you call *whole* tubers. 3. *Trifolium minus*, a starved specimen, which makes it resemble *T. filiforme*. 4. A Carex. Could you kindly send a better and more perfect example? it is probably a new variety. 5. Only part of a frond, difficult to name, but closely resembles *Polystichum angulare.*—*J. F. R.*

E.L.—You will find the best account of the Silbury Hill tumulus, as well as of the so-called "Druidical Stones" at Avebury, in Fergusson's "Rude Stone Monuments of Great Britain." The stalactitic-looking specimen is carbonate of lime, which has been deposited as tufa, round some twig. The fragment of rock is siliceous sandstone, probably Oolitic.

W. H. W.—Your box, containing the bat, came duly to hand, but it was in a high state of decomposition, and had to be "treated" before we could do anything with it. It is a specimen of the Great Bat, a "Noctule" (*Vespertilio noctula*). Its first notice as a British species appeared in White's "Natural History of Selborne," and it was named *altivolans* by that author.

EXCHANGES.

Puccinea malvacearum (Mont.), and *Triphragmium Ulmariæ* (Sk), offered for any other Micro-fungi.—Send stamped addressed envelope to H. Munro, Lyme Regis, Dorset.

PLANTS of *Valisneria spiralis*, for good Slides or Material.—J. Carpenter, Turner's-hill, Cheshunt.

EGGS of Bearded Tit, Crested Grebe, Redshank, Snipe, Waterrail, Coot, &c., taken on the Norfolk Broads, for other rare local Eggs (name localities where taken). Offers not answered are declined.—Philip H. Mason, pro F. Sutton, F.C.S., Eastern Counties Laboratory, Norwich.

LARVA of *X. Cithago*, for other Lepidoptera.—G. Jackson, Windy-bank, Netherton, near Wakefield.

LOWER Tertiary Fossils for Mounted Microscopic Objects.—C. C., 6 Landport-terrace, Southsea.

WANTED a specimen of wood bored by *Toredo* or *Pholas*, recent or fossil; state what wanted.—E. Lovell, Holly Mount, Croydon.

Pyrola media, Carum verticillatum, Geum rivale, for good Ferns or Microscopical Objects. Unaccepted offers not answered.—James Anderson, 46, Warwick-road, Maida Vale.

WOULD any of your correspondents kindly send me some Eggs or Larvæ of Ladybirds, Lacewing Flies, Ichneumon Flies, or any other eaters of aphides? Living in London, I have not much to offer in exchange: would House Ants be of value to any one?—E. F. B., 8, Ladbroke-square, London, W.

LIVING specimens of *Adiantum nigrum, Lastrea cristata, Athyrium Filix-fœmina, Scolopendrium vulgare*, for living specimens of *Ophioglossum vulgatum.*—Address, Mrs. Bidwell, 1, Handford Villas, London-road, Ipswich.

FIRST-CLASS Slides offered for Mole Crickets, Locusts, large green Grasshoppers, or Field Crickets.—C. L. Jackson, Hesketh-street, Southport.

A COLLECTION of Postage-stamps (700, besides duplicates) in Oppen's Album, for Apparatus or Books useful to Lepidopterist, or Botanical works.—Particulars from Thomas W. Gladstones, Alresford, Hants.

A COLLECTION of Dried Fronds of Exotic and other Ferns, named, for a small Case of Stuffed Birds; Humming-birds preferred.—F. Stanley, 4, Carroway's-place, Margate.

MICROSCOPIC OBJECTS, mounted and unmounted, for *good* unmounted Material.—Send list to W. Frederick Haydon, North View, Smethwick.

WITH any one who is collecting Diptera, and may have Duplicates to exchange, I should be glad to correspond.—Address, Wm. A. Vice, 15, Union-terrace, Aberdeen.

RARE PLANTS for Irish, Scotch, or Channel Islands species.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

MICROSCOPIC SLIDES for others.—Send list to G. E. Quick, Long-lane, Southwark.

EGGS of Quail, Nightjar, Dabchick, Nightingale, Barn-owl, and others, for good Eggs.—F. Wiglesworth, Ham-street, near Ashford, Kent.

WANTED, North British Marine Algæ, neatly mounted and reported, for South Devon and Cornish Sea-weeds, in the same form.—Henry Goode, 15, Mulgrave, Great Plymouth.

BOOKS &c. RECEIVED.

"In the Mosquito Country." By W. D. K. London: Wyman & Sons.

"Domestic Floriculture." By F. W. Burbridge. London: W. Blackwood & Sons.

"The Human Eye." By W. Whalley, M.R.C.S. London: J. & A. Churchill.

"Proceedings of the Literary and Philosophical Society of Liverpool," 62nd session. London: Longmans.

"Annual Record of Science and Industry, 1873." Edited by Spencer F. Baird. London: Trübner.

"Eclipses, Past and Future." By Rev. S. J. Johnson. London: J. Parker & Co.

"Botanical Labels." By Edward B. Aveling. London: Hamilton & Adams.

"American Naturalist." April and May.

"Canadian Naturalist."

"Grevillea." Edited by Dr. M. C. Cooke. June.

"Journal of Applied Science." June.

"Microscopic Dictionary."

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM:—T. S.—F. K.—J. S.—G. J.—W. L. W. E.—J. D.—G. C. D.—J. F. B.—C. J. W. R.—W. D. R. D.—W. R. L.—G. B.—L. L.—C. C. W. A. C.—P. H. M.—H. J. McG.—E. L.—R. E. jun.—J. H.—W. C.—T. S.—W. H.—R. A. P.—J. H. A.—E. L.—H. E. W.—J. L.—E. F. B.—H. G.—J. B.—T. C.—T. W.—W. H.—E. E.—M. M.—W. M.—W. A. C.—C. L. J.—J. M. H.—J. H.—T. W. G.—P. B.—W. B. L.—L. N.—R. H. M.—C. W. B.—W. H. W.—T. R. P.—B. B.—G. T. H.—J. A.—H. M.—L. F. K.—F. H. A.—W. C.—H. B.—J. B.—C. J. W. R.—C. T.—G. O. H.—T. McG.—F. W.—H. L.—G. B.—E. B.—A. A.—H. A. A.—J. B.—B. D. L.—H. M.—J. U.—F. S.—W. S.—W. F. H.—J. H. L.—W. A. V.—W. D.—G. F. D.—H. G.—J. S. T.—G. E. Q., &c.

SKETCH OF THE GEOLOGY OF BELFAST AND THE NEIGHBOURHOOD.

By W. H. BAILY, F.L.S., F.G.S., &c.

Palæontologist to the Irish Geological Survey.

BELFAST is situated on the Upper New Red Sandstone, "Bunter," and is covered by alluvium on the eastern side, being bounded by the river Legan; a higher division of the Triassic, or New Red Sandstone formation, consisting of red marls and sandstone, "Keuper," also extends across the country, having the cretaceous rocks as its boundary in a south-westerly direction.

One of the nearest geological places of interest in the neighbourhood of Belfast is that of Cave Hill, in the county Antrim, about two miles from the extreme northern end of the town. This hill, with other basaltic eminences west and south-west of Belfast, such as the Black Mountain, 1,272 feet in height, Black Hill, 1,884, and White Mountain, 820 feet high, present very prominent features in the landscape; their eastern slopes are rugged and precipitous towards the north, but more gradual and easier of ascent to the southward.

The basaltic plateau of the north-east of Ireland, of which this district forms a part, has been described by the late General Portlock in his Geological Report on Londonderry, Tyrone, &c.; its thickness on these hills ranges from 424 to 817 feet. Alternations of mineral character have been observed in these volcanic rocks, which indicate successive flows, with intervening periods of repose.

These hills form the escarpment of the Chalk and Greensand; sections of these sedimentary strata (which are sometimes penetrated by the basalt in the form of dykes), as well as of the Lower Lias, or Rhætic beds, are well exposed at Cave Hill. The quarries in the Upper Chalk "White Limestone" are extensive; the stone being largely used for lime, is conveyed by special tramway to Belfast.

At Collin Glen, in the same county, five miles south-west of Belfast, a deep ravine cut by the Collin river exposes similar strata, the upper cretaceous rocks resting immediately upon the dark grey or bluish shales of the Lower Lias, or Rhætic beds, under which are the marls of the Keuper division of the New Red Sandstone. The section at this place has been described by Mr. Ralph Tate, F.G.S. (*Quart. Journ. Geol. Soc.*, vol. xx. p. 103), and also by the Geological Surveyors in the Explanation to Map 36, "Geological Survey of Ireland."

The strata being displaced by several faults, the section exhibited is a very instructive one, with an abundance of fossils in some of the beds.

The oldest rocks are the Keuper marls, the uppermost division of the New Red Sandstone, upon which the Rhætic beds have been deposited, consisting of shales and thin bands of limestone, some of them full of characteristic fossil shells, such as *Avicula contorta*, *Cardium Rhæticum*, &c.

On these rest what Mr. Tate designates as the "Hibernian Sandstone," which he groups into three zones, the lowest, or "Glauconitic Sands," containing *Exogyra conica* in profusion, a shell belonging to the Ostreoid group; the middle division consists of "yellow sands and marls," with shells, &c., amongst which *Pecten quinquecostatus* is the most prevalent; and the upper, upon which the Chalk rests, is "Chloritic Sandstone," locally termed "Mullatto;" in the beds of this division another species of Ostreoid shell, *Exogyra columba*, is plentiful, with numerous remains of sponges, resembling Siphonia of the Warminster Greensand.

At Woodburn Glen, two miles north-west of Carrickfergus, similar strata are to be seen, cut through by the Woodburn river.

At Kilroot, on the north shore of Belfast Lough, about two miles north-east of Carrickfergus, there is a raised beach, with worked flints overlying marls and clays, containing marine shells of existing species, with drift-wood, hazel nuts, leaves, &c.

The post-tertiary deposits of Belfast are remarkably rich in marine shells; lists of these have been published by Messrs. James Bryce and George C. Hyndman, from observations made during the construction of reservoirs for supplying the town with water, three-quarters of a mile from the town and close to the Antrim road; also by Dr. McGee, from others obtained from the excavation made in 1830 for the basin, now called the Prince's Dock. The Rev. Dr. Grainger has since given more extended and complete lists of these shells in subsequent papers read at the Geological Society of Dublin; British Association (Belfast Meeting); University Zoological and Botanical Association; and the Natural History Society of Belfast.

On the Belfast and Northern Counties Railway at Ballypalady (Ballyclare and Dough station), about seven miles from Carrickfergus Junction, and a little more than half an hour's ride by rail from Belfast, there is a cutting between Ballyclare and Templepatrick stations, where a lignite bed may be observed associated with pisolitic iron ore, and lithomarge interstratified with the basalt which overlies the chalk. This iron ore has been worked in the immediate neighbourhood, and at various places still farther north, becoming a considerable source of emolument to proprietors.

Some of the beds connected with this iron ore, especially at the locality above-mentioned, contain a great abundance of vegetable remains, consisting of the fruit, leaves, and stems of plants. Some of these have been described by Mr. W. Hellier Bailey, of the Geological Survey of Ireland, in the *Journal Geol. Soc. of London*, vol. xxv. (1869). They were stated to be for the most part leaves of dicotyledonous trees, amongst which some were referred to the beech, oak, and buckthorn, with several conifers, such as pinus, cypress, and a sequoia, the whole assemblage indicating a Miocene age as that at which the basalt was poured out over so large an extent of country as it is in the north of Ireland, being estimated at about 1,200 square miles.

On the shore, a little north of the village of Holywood, a station on the Belfast, Holywood, and Bangor Railway, south side of Belfast Lough, at Cultra, are rocks belonging to the Upper Sandstone of the New Red Formation, or "Bunter:" these rocks are traversed by three trap dykes of a grey or dark green crystalline basalt. A fault at this place brings in the Lower Carboniferous Limestone shales, full of characteristic shells, especially *Modiola Macadami*, and small entomostracan crustacea, *Cythere*, *Leperditia*, &c. Several dykes of a similar character occur in these shales, which extend for about a mile along the shore. A little farther north a series of beds may be seen below high-water mark, believed to be of Permian age; they consist of yellow and buff-coloured magnesian limestone, below which are red marls and thin-bedded fossiliferous limestones. The beds appear to lie unconformably upon the limestone shales, terminating eastward by a basaltic dyke, which coincides with a line of fault.

Scrabo Hill, near Newtown Ards, county Down, about eight miles east of Belfast, is the highest point (540 feet) of the irregularly-shaped basaltic plateau, which, as well as that of Dundonald, General Portlock considered to be outliers of the large basaltic sheets of the county Antrim.

This prominent hill is of special geological interest. The quarries of Upper New Red Sandstone, "Bunter," supply a good building stone, and exhibit fine sections, showing not only the trap rocks, which mostly consist of a crystalline Dolcrite, weathering into large spheroidal masses, overlying the Triassic Sandstones, and forming the summit of the hill, but spreading in horizontal sheets through the mass of the sandstone, which is again traversed by vertical dykes of later date, a phenomenon which is well exhibited in the south quarry. (See Explanation to Sheet 37, &c., "Geol. Survey of Ireland," p. 14, fig. 1.)

At Castle Espie, on the south shore of Strangford Lough, near Comber, about ten miles south-east of Belfast, the Lower Carboniferous Limestone and underlying shales are well shown in a quarry belonging to J. Murland, Esq. The limestone is red or salmon-colour, and is very fossiliferous; the fossils, principally Brachiopod and Cephalopod shells, are well preserved, and some of them of very large size, especially *Productus giganteus* and *Actinoceras giganteum*, the latter being called by the quarrymen "Pillars."

The underlying shales, which are also red, contain an abundance of characteristic Lower Limestone fossils.

Lower Silurian strata may be observed all round the coast north of the Lower Limestone shale of Holywood and Cultra to Bangor, at the entrance of Belfast Lough, with occasional beds of black slates containing graptolites; continuing still further round the coast to Donaghadee, south of the Lough (Belfast and County Down Railway), and especially at a place called Coal-pit Bay (from a mistaken notion that these beds were coal shales), where they are full of graptolites, of several species, in beautiful preservation, including *Rastrites peregrinus*, *Graptolithus Sedgwicki*, *G. tenuis*, *and G. Becki*, *Diplograpsus pristis*, &c.

"The effect of subaërial action is to render the surface of the earth more rugged, by forming valleys and hills."—*Skertchley's Geology.*

THE CANTERBURY TICK

(*Argas reflexus*).

THE genus Argas is nearly allied to the true Ticks (Ixodes), but may be known at once by the flat, shield-like body, slightly narrowed in front, and by the short beak being closely applied to the abdomen. The species are few; among them is the Malleh or Poison-bug of Miana, to which travellers' tales give such a melancholy reputation. After allowing for exaggerations usual in such cases, the fact remains that this animal (*Argas Persicus*) is more or less abundant in Persia and Egypt, from which latter place specimens lie before me at this moment; that they are found on the walls of houses; and that (like the common bed-bug) they attack sleepers at night, leaving behind a painful wound and disappearing at daylight. We are assured by the younger Kotzebue, in his "Journey through Persia," that sometimes the inhabitants of a village are entirely driven away by these vermin. On the other hand, we are also told that in Miana, which seems to be its head-quarters, the poison-bug attacks strangers only, to whom the bite is fatal within twenty-four hours. But may it not be that fevers, which are very prevalent in Miana, are the real cause of death, and that it is to them, and not to the bite of this animal, that strangers succumb?

The much-dreaded Malleh has an uncanny aspect, which, to me at least, recalls the disgusting Surinam toad; perhaps on account of the indented surface of the flat pear-shaped body. The whole of the upper side, which is of a brownish-red hue, is thickly punctured with round white cavities, extending in rows, though by no means regularly, along the edge and lower half. The eyes are wanting. In this respect, as well as in the structure of the legs and beak, the poison-bug is exceedingly like a second species found in Germany.

There is the mussel-shaped Tick (*Argas reflexus*).* Its habits of life appear to be much the same as those of its Persian relative, living in human habitations, where it conceals itself in fissures in the wall during the day, and at night issuing forth to suck the blood of pigeons, especially the young ones, which it not unfrequently kills.

Such is the statement given by Latreille of this tick. Independently of him, another French writer, Hermann of Strasburg, has given an account of it in his "Mémoire Aptérologique" (1808), where he names it *Rhynchoprion*† *columbre*, expressing his surprise that it had not been described hitherto, since it had been known to his father for the past thirty years as a troublesome parasite on pigeons.

Up to this time France and Italy had been specified as the native lands of this tick, but Herr Schäffer had suggested that it would probably occur in Germany; and this suggestion was confirmed about ten years ago, when the animal was found, curiously enough, in two places situated widely apart and under very interesting circumstances.

In the beginning of the year 1859 specimens were discovered by Dr. Boschulte at Camen in Westphalia, in the upper chambers of a massive stone house, in the centre of which was an equally massive tower, communicating through the window of a bedroom (at least up to the year 1857) with a dovecot. According to the latest report, the ticks were still to be found on the walls of this room in considerable quantities, so that at any time of the year numbers could be taken with but little trouble. From the circumstance that individuals were captured of various sizes, it was justly surmised that they prospered and regularly bred, although the inhabitants of the house were few, and no longer had any communication with the pigeons.

In 1863 the clergyman at Freideburg on the Saal, Herr Neide, sent two living examples of *Argas reflexus* to the Zoological Museum there, with the remark that they had caused much pain to his children at night by biting them. As soon as this news reached me, I begged him to give me some more detailed information, and the substance of his reply I repeat here. The ticks were found almost exclusively in a room in the upper story of his house, in which (up to the year 1859) was a doorway and along the wall a number of pigeon-holes. In the following year, after some alterations had been made, the ticks appeared in the rooms both above and below this, and to this day cannot be entirely got rid of. During the day they are never seen, either on the person, the clothes, or the beds; but each evening they appear on the walls or the ceiling—always, however, at rest, and never crawling; for the moment any one comes near they lie perfectly still, and if touched feign death. Gerstäcker also noticed their extraordinary dislike to the light in the specimens sent him by Dr. Boschulte; for no sooner did he shake them from the collecting-bottle on to a sheet of paper, than they hurried away to the darkest retreat they could find, between the back of the paper and the table.

Most of the wounds inflicted on sleeping persons occur on the hands and the feet, from which I infer that they do not seek the warmth of the bed itself so eagerly as does the common bug. The injury consists of an indistinct red point, which is accompanied by a violent itching, less however on the point itself, than on the surrounding veins. For instance, a wound made between the fingers causes an itching in the whole arm up to the shoulder, and

* The "Canterbury Arachnid" of p. 121, *antè*.

† This generic name was given by Karsten to the Jigger or Chigoe, a species of flea, and therefore belonging to a totally different order. The Chigoe is better known by Westwood's prior title of *Sarcopsylla penetrans*.—W. W. S.

one on the foot up to the hip. To scratch the wound causes the inflammation to extend widely, especially in children: in a little child of five years old bladdery pustules appeared on the hand, wrist, and lower arm, exactly as though she were suffering from a severe burn. The irritation remains about a week. In fact the annoyance and pain caused by this animal in our temperate zone appear to be scarcely less than what the so-called poison-bug produces in the hotter regions of Persia and Egypt.

The body of this interesting tick has a flat appearance from above. It is entirely without segments, but is provided with slight impressions, the largest of which, of an oval form, are situated on the fore part; most of the remainder, which are smaller and whitish, inclose in the lower half a festoon-like space, which is cut in half by a groove or elongate depression. The upper surface is a rusty yellow; the outer rim, the legs, and the under surface of a dirty white—at least, this is the case in the animals after death. The legs lie close together at their attachment to the body, and terminate each in two strongly bent claws without cushions. These claws, however, do not coalesce with the last joint of the foot, but are connected with it by two very thin rings, which must give them much more play. Just in front of the first pair of feet is situated the short horizontal beak in a cavity provided for the purpose. It appears to be in every respect similar to that of the true Ticks.

Besides this species (*reflexus*) and the poison-bug (*Persicus*), there are two others—*A. Fischeri*, from Egypt, and *A. Mauritianus* from the island whose name it bears. But our knowledge of these (as is the case with most of the members of this order) extends only to their outward appearance. As regards *A. Mauritianus* it has been ascertained that it lives on poultry, and often causes their death.

A fifth species (*Savignyi*), from Egypt, is referred by Koch to a distinct genus, Ornithodoros, on account of the presence of eyes, which are situated on the lower surface of the body.

E. L. Taschenberg.

BIRDS AND FLOWERS.

It has been with peculiar interest that I have read the remarks in Science Gossip (p. 135), entitled "Birds and Primroses." For several years I have noticed with wonder the havoc made in our garden upon the primroses and crocuses just as they first appear in the early spring. Having a considerable number of primrose-roots growing in our plantation and orchard, we have been greatly surprised to find as the flowers first appear they are bitten off, or rather pulled out from the calyx, and lie round the roots as if some little children or dogs had amused themselves with this apparently thoughtless work of destruction; indeed some few years ago, we flogged our little dog, who used with great pleasure to watch our gathering the flowers, and we suspected him to be guilty of afterwards pulling the primrose flowers off to eat them (as the petals were partially eaten); but when, after his death, the flowers were still pulled off in the same manner, we discovered they were cut off by the birds, which seem to select the more solitary roots in preference to those growing thickly together.

My attention was much called to this being the case while visiting, in April this year, some friends living in a lovely part of Staffordshire.

In their garden there was one large primrose-root, which I noticed each day while there until all its flowers were pulled off, or nearly so, and lying, many of the petals half eaten away, round this one solitary root; while in the lanes round the hall, the banks of which for one or two miles in every direction were thickly studded with primroses, looking more beautiful than I can describe, I only on one occasion observed any roots whose flowers were pulled off in the same way, and then it was the case with a few roots growing by the side of the public road. We have never noticed any of our polyanthus flowers thus destroyed, but the crocuses very much; for some time we believed they were cut off by the mice in order the better to get to the roots, of which they are very fond, but for the last year or two we have felt sure that it has been the birds which have thus bitten off both the primrose and crocus flowers.

We are inclined to think the chaffinches and the sparrows are the birds that commit the largest devastation upon these sweet, early spring flowers, especially the latter, which are known to pull off the cherry blossoms in the same way. But why they thus pull off the flowers of the primrose and crocus I know not, I should like much to know, and also why they choose the more solitary roots in preference to those growing together. I have long pondered over the subject, though I did not know it was now occupying the attention of others, until I saw the article in your valuable magazine last week.

If I may be allowed to venture an opinion, I think it is more than probable that the birds are in search of the small insects as well as the nectar found in these flowers, which come out before the birds perhaps are able to find other food they like so well.

Often, too, the little white slug, so destructive to our plants, shelters under the primrose-leaves, especially in damp situations, which may be another source of attraction to the birds. Perhaps others may not have remarked that in May and the end of April, the primroses are for the most part left to develop themselves in their sweet modest beauty. It will be with very great pleasure I shall look forward to further information upon a subject of so much interest.

E. Edwards.

THE HOLMAN SIPHON-SLIDE.

WE have much pleasure in placing before our readers an illustration (borrowed from the *Monthly Microscopical Journal*) of the above remarkable slide. It was first exhibited at the "Microscopical section of the Academy of Natural Sciences" of Philadelphia, by Dr. Joseph G. Richardson, who stated that the apparatus was composed essentially of a strip of plate-glass, of the ordinary length and width (namely, three inches long by one inch wide), but double the usual thickness, in the upper surface of which had been ground a shallow groove, elliptical in both its transverse and longitudinal section, and deeper towards one extremity. The excavation was so arranged as to receive a small fish, tadpole, or triton, and retain it without, on the one hand, injury from undue pressure, but without, on the other, permitting any troublesome gymnastics beneath the thin glass cover, which, when applied, formed the ceiling of the cell. The great improvement of this slide consisted, however, in the embedding of a small metallic tube (communicating with each extremity of the groove) in either end of the slide, and the adaptation to these two tubes of pieces of slender caoutchouc pipe, about eighteen inches in length, one of these being intended for the entrance and the other for the exit of any fluid, *cold* or *hot*, which it might be desirable to employ. For examination of larger reptiles, and for demonstrations with the gas microscope, a slide four inches long, with two oval concavities, and a narrow groove more deeply cut for the body of the creature, as shown in the figure, has been devised. With such an apparatus, through which a current of ice-water can be passed, the injurious heating effect which ordinarily attends the use of calcium or electric light to illuminate living specimens is entirely counteracted. When in use it is only necessary to place the animal (in the case before us a little triton) with some water in the groove of the slide, cover it with a sheet of thin glass, immerse the end of one of the caoutchouc tubes in a jar of water, and then applying the mouth to the extremity of the other rubber-pipe, make sufficient suction to set up a flow of the liquid through the apparatus. The stream of fluid (of course bathing the animal in the cell during its passage) can readily be kept up as in any other siphon for hours or days, and its rapidity exactly regulated by graduated pressure upon the entrance-pipe, so that in this way a triton may be examined continuously (as stated by Dr. J. Gibbons Hunt), for a whole week without material injury.

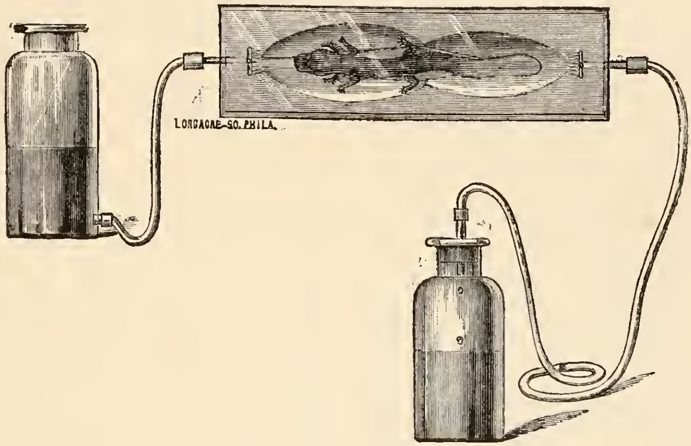


Fig. 114. Holman's Siphon, or "Life" slides, showing the means by which circulation of water is carried on.

Among the great advantages of this very ingenious contrivance may be enumerated: first, its security, the animal being prevented from escaping, and the joints of the apparatus being kept tightly closed by the pressure of the atmosphere; second, its portability, the whole preparation, for example, one for showing the circulation of the blood, being made at home, as was done in this instance, carried to a lecture-room in the pocket, and exhibited to an audience hours afterwards; and third, its convenience, this arrangement permitting the removal of the slide at any time from the microscope stage, to make way for other experiments, and its instant readjustment when desired.

Dr. Richardson invited the attention of members to the remarkably clear and distinct view of the circulation displayed by the aid of this apparatus in the caudal extremity of a triton beneath one of the microscopes upon the table, and pointed out as especially worthy of note the marked prominence of nuclei in epithelial cells covering a portion of the tail where blood-stasis had occurred, in consequence of a minute puncture purposely made before incarcerating the reptile. He suggested that this change was doubtless the visible exponent of that pathological alteration of the circumjacent cellular elements which constitutes such an important although as yet imperfectly understood factor in the inflammatory process.

THE OLDEST INSECT-TRAPS ON RECORD.

THOUGH generally a kindly mother to the insect population, offering them an abundance of food and shelter, the goddess Flora has a dark side to her character; and apt though we are to associate with her all that is smiling and cheerful, she helps largely to thin the ranks of the little creatures which come to rifle her treasures. There are the moulds, *par exemple*, such as Empusina,* which appears in the autumn as a tiny cloud of white dust surrounding some unhappy fly, which with outstretched legs looks as if it were glued to the window-pane; or as *Botrytis bassiana*, commonly called Muscadine, which works such havoc among the silk-worms of Italy and France. Another insect-slaying fungus is the singular Cordiceps or Torrubia, which attacks its victim at the back of the head and grows up into a club-shaped stem, the lower part ramifying through the insect's body, until "the whole insect seems entirely metamorphosed into vegetable, with the exception of the skin and intestines." (Dr. Hooker, *Journal of Botany*, 1841).† Among the higher forms of vegetable destroyers we find the well-known Venus's fly-trap (Dionæa), which crushes its prey in an embrace of death; its relatives, the Sundews, which suck the life out of a fly or ant by means of the glutinous threads on their leaves; and all plants with viscid stems or with hairs pointing downwards in corolla or pouch, allowing entrance but forbidding exit to the deluded insect, of which the American Darlingtonia is a notable example. Then there are the curious Pitcher-plants and the Saddle-flowers (Sarracenia) and the Cephalotuses and others, whose leaves are so fashioned as to form at the apex deep jars, into which flies and moths innumerable are seduced by the pleasant fluid at the bottom, only to meet a watery grave. These "gay deceivers," however, are all of recent types. To find the oldest fly-trap we must go back to the old prehistoric times, when insects had nothing to fear from man's acquisitiveness, for the simple reason that man did not then exist; or, if he did perhaps walk the earth, his intellect was of the lowest, and collections and museums were undreamt of. I allude to the days when amber was forming, and vagrant insects were being daily entangled in its viscid toils, and there preserved for the wonder and admiration of modern *savants*.

Amber is a semi-transparent substance of a light yellow or brown colour, capable of taking a high polish, and therefore much employed in the manufacture of mouth-pieces to pipes, heads of canes, necklace-beads, and such small matters. The principal source of supply is (and has been from time immemorial) the coast of the Baltic Sea between Memel and Dantzic, where it is disseminated with layers of lignite in the sand or clay. It is searched for in the sea or on the shore, or is picked from the cliffs with iron hooks at the end of long poles, or it is regularly mined, the shafts being sometimes sunk to the depth of one hundred and fifty feet. Saxony supplies a small quantity; it also occurs in Sicily, in Siberia, Sweden, Italy, and other parts of Europe. Amber occurs in varying quantities, in nodules or nuggets of different sizes, sometimes as small as grains of coarse sand, at others of much larger proportions. One of the largest pieces on record is deposited in the Museum of Minerals at Berlin. This great mass, which measures upwards of thirteen inches in length, eight inches broad, and four to six inches thick, with a weight of over thirteen pounds, was found near Gumbinen, in Eastern Prussia, in the year 1803. The fortunate possessor received for his prize one thousand thalers, or £150; it real value however far exceeds that sum.

There is no doubt of amber having a vegetable origin. It is, in fact, a resinous exudation from an old-world pine-tree, which has long since died out from the earth, named by Göppert *Pinites succinifer*. Pinites was closely allied to our modern spruce; consequently amber is in its nature exactly analogous to the lumps of resin which occur in every fir plantation in the present day. Indeed, if anything were wanting to prove its originally fluid condition, it would be the fact that *débris* of various kinds are frequently found embedded in it. Fragments of the flowers, leaves, and twigs of more than one hundred and sixty species of plants have been detected by the indefatigable Göppert (*Lennis Botanik*). But it is as an insect-trap that I introduce it here. In examining a piece of amber, one is often struck with the fact that these little creatures, or portions of them, are scattered through the mass in every possible position. I have before me at this moment a piece about two inches square and of moderate thickness, which is crowded

* Cohn named this (supposed) genus *Empusa*, meaning a spectre; but that title had already appropriated by Illiger to a family of Orthopters, allied to the Praying Insect (*Mantis*); whereupon the fungus was rechristened *Empusina*; and also *Sporendonema* by Desmarest.

† For an interesting account of this fungus and its mode of action, see SCIENCE-GOSSIP, 1866, p. 127.

with insects. Within its transparent substance I observe a tiny beetle, apparently allied to our clythra, several small gnats, the remains of a moth (rather a rare find, by the way), and a number of white ants (*termites*); there must be a dozen or more present, all winged, besides several detached wings, quite perfect in their outline, and with the neuration beautifully clear.

It is evident that the little creatures settled upon the treacherous resin at a time when it was in a semi-fluid condition, and were of course retained there by the viscid nature of the substance. The gum, as it flowed from the body of the tree, gradually surrounded its victims, and at last entirely inclosed them in a premature but very beautiful tomb, so that Pope's question can be answered more satisfactorily now than in his day:—

> "Pretty, in amber to observe the forms
> Of hairs, or straws, or dirt, or grubs, or worms.
> The things, we know, are neither rich nor rare;
> But all the wonder is—how they got there!"

Amber-caught insects are found in different degrees of preservation. Some, which were evidently engulfed at once in the sticky matter, are as perfect as the day they were killed. Others have been consigned to a more lingering death; the resin has exuded very slowly, and the victims have not only died before they were surrounded by it, but having been trapped in bright dry weather, their bodies have become desiccated and withered; in some instances, indeed, a white mould has begun to form round them, plainly discernible in the pellucid amber. At least two minute fungi—*Brachycladium thomasinum* and *Penicillium curtipes*—have been detected; traces of other genera also occur. (Berkeley's "Cryptogamic Botany.")

As a rule, the inclosed insects are not widely different from—many species are actually identical with—those now in existence. At the same time "the insects found in amber are not those which belong to our latitudes, yet there are many forms which perfectly agree with ours. This may especially be said of the smaller flies and gnats; but particularly in the cockroaches, many beetles, and the majority of the Hymenoptera, the resemblance to exotic forms is still greater." (Burmeister's "Manual of Entomology," by Shuckard.) Without going into minute details, it may be sufficient to mention that at least one-half of the insect orders have had their representatives embalmed in the golden fluid; and that most of them, as may be imagined, are of species which frequent woods and thickets. Amongst Coleopters are numerous tomicids and weevils: the Orthopters supply locusts and grasshoppers, the Dictyopters a few cockroaches. In Hymenopters we have ants, ichneumon flies, and a bee allied to the South American Trigona; in Lepidopters a large hawk-moth and several caterpillars. Of Neuropters there have been captured dragon-flies and white ants (*Termites*), a lace-fly (*Hemerobius*), and an ant-lion (*Myrmecoleon*). Various kinds of Hemipters (land and water bugs) have been detected; also divers Homopters, a flata, and several cicadæ; while of Dipters the list is well-nigh interminable.

Other transparent resins which embrace insects in their deadly fold, are known in commerce as copal and gum animé. Though largely employed in the arts, little is knows of their history. That they are of vegetable origin, as in the case of amber, is certain; though the exact species of tree which produces them is scarcely yet known. In all probability they are the product of two leguminous plants, Hymenæa and Trachylobium, species of which are indigenous in South America, Southern India, and Africa West and East. With regard to the latter region, Dr. Kirk, British Consul at Zanzibar, informs us, through the Linnæan Society, that "Specimens removed from the living tree show that large masses, equalling the fossil in size, are still produced, and are as full of insects as were those of the ancient forests." Indeed, so large a quantity of organic remains do these resins contain, that the name of "animé" (animated) is fully justified. But while the Trachylobium of Eastern Africa still gives forth an amber-like fluid from its stem, and the same fluid exudes from the roots of the American and Indian Hymenæa, the late Dr. Welwitsch stated his decided opinion—also in a paper read before the Linnæan Society—that the copal of Western Africa is, like amber, of a fossil nature, "produced by trees which in periods long since past adorned the forests of that continent, but which at present are either totally extinct, or exist only in a dwarfed posterity. The copal is eithe dug out of the loose strata of sand, marl, or clay or else it is found in isolated pieces washed out and brought to the surface of the soil by heavy rainfalls, earthfalls, or gales." Burton also, in his work on Zanzibar, speaks of gum copal as though it were mainly if not altogether fossil.

From these statements it would appear that the copal of commerce is of both recent and fossil origin; that its masses are crowded with imprisoned victims; and that consequently copal and amber form the most ancient insect-traps of which we have record.

W. W. Spicer.

Itchen Abbas.

Carduus tenuiflorus at Llandudno.—It is very difficult to ascertain that a plant has entirely disappeared from a given locality. As an illustration of this, I may mention that *Carduus tenuiflorus*, which Mr. Edwin Lees (p. 128) says has "entirely disappeared" from Llandudno, was growing there last July in some abundance.—*James Britten.*

MÖLLER'S NEW DIATOMACEEN TYPEN PLATTE.

THE veteran microscopist must unavoidably be struck with the great improvements that have taken place within the last ten years. The attempts at microscopical manipulation of the latter part of the last century, of which specimens may still be found, forcibly remind one of the artistic efforts of our prehistoric ancestors. The old-fashioned plan of mounting between two little discs of talc placed in a slip of ivory about half inch wide and some three inches in length, with six apertures made in it (of these many are still in existence), was superseded when Canada balsam was introduced as a medium for mounting microscopic

Fig. 115. Specimen of Moller's Typen Platte, × 100 diameters.

objects. The introduction of balsam necessitated the better preparation of the objects themselves, and microscopists adopted various methods for that purpose. The maceration of insects and calcareous material in caustic alkalis, the preparation of sponge spiculæ and diatoms by means of hydrochloric and nitric acids, were found to be the most effectual methods for getting quit of extraneous matter. The cleaning and mounting of the Diatomaceæ, particularly those forms which afforded the best tests for the higher powers of the microscope, occupied the attention of those microscopists who were anxious to obtain clean material for mounting. Although by various improved methods the presence of vegetable matter was eliminated, micaceous and siliceous sands still remained; and as a last resource, diatomists adopted the plan of selecting individual forms from the surrounding *débris*, and transferring them to clean slides. Not satisfied with this, some mounters arranged the selected forms in symmetrical patterns, and eventually Herr Möller introduced his Typen Platte, in which we had some four hundred species systematically arranged in a space of a quarter of an inch. These exquisite specimens of manipulative skill have now been outdone by his new Typen Platte; this, although not containing so many forms, is still more remarkable not alone for the beauty of the forms, but also for the method of their arrangement. The following short description will perhaps interest those who have not been fortunate enough to have inspected the "Platte." The objects are mounted between two pieces of thin glass; these are afterwards set in a brass plate (three and a quarter inches by one and a quarter); on the covering glass is a photograph about four mm. square, of eighty circles (ten in a longitudinal and eight in a vertical direction); beneath every circle is the name of the object and its author; in the centre of these circles a diatom, and in many cases two are mounted (in order to show front and side views). The accompanying diagram will enable the reader to understand the method adopted by this most skilful manipulator. —*F. Kitton.*

[I believe these marvellous specimens of the mounter's art may be obtained of Mr. Baker, 244 High Holborn.]

A PLEA FOR OUR GRASSES.

I SHOULD think that there is scarcely any one of mature years who is not in one sense or another familiar with that particular part of our vegetable kingdom—the grasses; and especially those of them which, on account of the nourishment they afford to man and beast, have either been acclimatized to, or else have always been common to, the soil and climate of this country from time immemorial. Who, for example, is unacquainted with a field of wheat, of barley, or of rye, when he sees it! Or who of us can recall a country stroll unassociated with green fields and grassy meadows, or of a country road of unfringed green? Indeed, you have but to strip the earth of its grassy mantle, and you rob it of that hue which, in the landscape, the eye can most untiringly rest upon. In short, these are all scenes to which the eye of the wanderer has been so naturalized to and familiarized with from earliest years, that without them now the country walk would be shorn of its charms.

Though the grasses taken comprehensively are a large family, and would take much of our time and investigation before making their acquaintance, botanically speaking, still those really useful grasses to which I am here alluding as constituting much of our meadow and pasture land, form comparatively but a very small percentage of the whole. For instance, I dare say most, if not all, are comprehended under the following genera: *Festuca*, *Poa*, *Holcus*, *Phleum*, *Hordeum*, and *Alopecurus*—embracing in all not more than about sixteen or eighteen different species. And yet, seeing this, the wonder to me is that more special prominence has not been given to them by our leading botanists; nay, that they have not, in common with our other and more conspicuous flowering plants, been honoured and popularized like them, by being made the subject of a separate treatise. Some, though not all, I am pleased to find, have not altogether been passed by in "Half-hours in the Green Lanes." Still I would not, as there, have noticed them thus promiscuously. They are deserving of more special notice; and not only so, but by being taken in some more distinct way, I think it would have a tendency to revive what I fear will otherwise soon become a hopelessly forsaken study. For I should think that there is no class of plants—save perhaps the *Umbelliferæ*—whose study is more neglected, and of which many are so "familiarly ignorant," as the grasses, to which might also be added that of their glumacean friends and near allies, the sedges. Therefore, if for nothing else than to show the characters whereby to discriminate between such two natural and nearly allied orders as these—*Cyperaceæ* and *Gramineæ*—it would effect some good and dissipate much existing ignorance. How often, sadly often it is, that we see people—and many professed students of botany too—confounding grasses for sedges, and *vice versâ*.

Certainly the grasses have much to contend against in gaining equal attention with their more attractive and conspicuous flowering brethren I know. They have not, for instance, that same beauty and diversity of colour, of leaf, and of form. Then, again, they are more complex, demanding greater and more careful research, and these are points which, I am sorry to say, are allowed to weigh too seriously with many. In point of fact, these "botanically despised" plants seem to ask them, as it were, too many questions, often requiring them to discriminate between panicles, racemes, spikes and spikelets, between glume and glumellas, between barren and fertile florets, and the like. Others, again, will despairingly say, as an objection, that they are a large family of one natural order, of many (forty-four or so) genera; and, what is worse, of still more species. Whilst others, taking another view, will say they are such a "strikingly" alike family, that they do not care to graduate and wade through all the points, in which one species differs from another, much more to retain them in mind, intervening between Anthoxanthum and Digitaria. They think to carry in eye and mind the minute differences which exist between one species of poa and another, is quite puzzling enough; or even, it may be, what is less, between the two quaking grasses (*Briza media et Briza minor*). But another objector still will say that their differences, in many cases, are so apparently hidden that one needs to "microscope" the eye to detect them. Alas! alas! that all such parties should forget the habits of discrimination and observation they are thereby omitting to form; the opportunities neglected of improving and strengthening their memories—all of them, I am sure, qualities of too invaluable worth not to be contended for, particularly by such as desire to prosecute the study of any science successfully, be it that of botany or any other.

With regard to botanists, whose knowledge of most other plants seems somewhat advanced, and with whom no "plant" specimen, save it be comprehended in the class they most admire, seems to be admitted by them as a fit object for the designate of "find" must, I should think, be well nigh ignoring, or denying altogether the existence of the botanical claim and interest of the grasses. Still, of those to whom the science forms a branch of study at all, I think, for my own part, it argues but very little for the enthusiasm with which they approach the subject, and especially in such cases where they are content with a "popularly known" knowledge of such grasses, a sweet-scented vernal grass, *Anthoxanthum odoratum*, and quaking grass,—grasses which from the attractive character each possesses, have seemed to have monopolized to themselves the attention of almost everybody—botanical and unbotanical alike—and this, based no doubt upon their severally forming two such fitting representatives of the odoriferous and graceful of our British grasses.

Another grass, even commoner than either of the preceding, but not nearly so commonly known among us, we have in the annual meadow grass, *Poa annua*. This little perennial seems to assert itself almost everywhere; and, though it cannot be said to possess in any degree the odour of the sweet-scented vernal grass, or the grace of the quaking grass, nevertheless it has that wherein it doth glory. For if I were asked to name that grass which of all others most truthfully emblematized and claimed the comparison expressed in the saying as "green as grass," I should at once, and most unhesitatingly, point you to this.

From these it would now be very easy to descant on such characteristically-named grasses as Fox-tail, Cat's-tail, Dog's-tail, Hare's-tail, down to the Finger-grass, all of them names which, to most, I dare say, are as yet better known in connection with, and as pertaining to such objects as animals rather than plants. To such, then, in conclusion let me say, seek to extend your knowledge of created things—of plants and animals alike—and learn not to respect one part of the Creator's works as being more worthy of your study and admiration than another, and in so doing I doubt not that you will be continually discovering fresh reasons for magnifying the Creator of all things more and more, and these as abundantly afforded in the study of our British grasses as in any other one of God's works.

Wicker, Sheffield. JOHN HARRISON.

"All animals are normally attired in that dress which is most suitable to their respective conditions and habitations."—*Whalley on the Human Eye.*

HISTORY OF OUR CULTIVATED VEGETABLES.

No. IV.—The Cabbage (*Brassica*).

THE Cabbage tribe is, of all classes of cultivated culinary vegetables, the most ancient as well as the most extensive. It belongs to the numerous family *Cruciferæ*, which comprehends Turnips, Radishes, Mustard, Cress, and other esculents. Not only does this class afford a great amount of wholesome food to mankind, but the seeds of many species are valued on account of the oil they yield, and the showy garden flowers, such as the Wallflower, Stocks, &c., they produce. No person unacquainted with the history of the Cabbage, walking along the chalky heights of Dover, or other sea-cliffs of the South-West of England, during the summer months, would suppose that a plant seen growing there, with large, wavy, and variously-formed glaucous leaves, the stem bearing a spike of pale yellow flowers, and scarcely distinguished from the wild mustard, or charlock, should be the uncultivated state of our garden Cabbage (*B. oleracea*), and the parent of the Cauliflower, Brocoli, Kale or Colewort, and their endless sub-varieties. This has been proved by the fact that the Red Cabbage of neglected gardens at the seaside passes back again in a few generations to the condition of the Wild Cabbage. In localities where it grows pretty freely, the poor inhabitants collect the leaves, and after boiling them in two waters to remove the saltness, eat them at their meals.

All the varieties may be reduced to three classes —Cabbage, Kale or Colewort, and Cauliflowers. The first class comprises those kinds in which the leaves gather into what is called a head, and are blanched by their own compression. The second, Kale or Colewort; the leaves are expanded and coloured, with the exception of a small portion of the centre, which incloses the rudiments of the flowering-stem, and is commonly cultivated under the name of green or Scotch Kale, and purple or brown Borecole. The third division consists of Cauliflowers and Brocoli, which have the flowering-stem short and succulent; the flower-buds, before developing, form a close, firm, curd-like head, not higher than the leaves. Some varieties of this vegetable have been cultivated from the earliest times of which we have any record; but, after a lapse of so many ages, it is impossible to determine what kind of Cabbage the Greeks and Romans allude to in their works, as no genus of plants are more liable to sport or run into varieties and monstrosities. The most ancient Greek authors mention three kinds of Cole: the crisp or ruffed, which they called Selinas or Selinoides, from its resemblance to parsley; the second was called Lea, and the third Corambe.

Two of their physicians, Chrysippus and Dreuches, who lived in the third and fourth century before the Christian era, as well as Pythagoras, are said to have written books on the properties of this plant. It was observed by Pliny that coleworts may be cut at all times of the year for our use, so they may be sown and set all the year through; but the most appropriate season is after the autumnal equinox. He adds: "After the first cutting they yield abundance of delicate tops, so there is no herb in that regard so productive, until in the end its own fertility produces its death." It was the custom with the Romans, when they transplanted their Coleworts, to put seaweed, or a small portion of powdered nitre, under their roots, imagining that they would the sooner come to maturity: others threw trefoil and nitre upon the leaves for the same purpose: it was also thought to make them boil green. "If you would have very fine Coleworts, both sweet in taste and great for cabbage," observes Pliny, "first let the seed be sown in ground thoroughly digged more than once or twice, and well manured; secondly, you must cut off the tender spring and young stalks that seem to put out far from the ground, and such as run too high; thirdly, you must raise mould or manure up to them, so that they may not be more above ground than the very top." These kinds of Cole, he says, are justly called Tritiana, for the threefold care about them.

There are various kinds of Coles mentioned by this author, distinguished by the names of the places where they grew: among these, the Coles of Brazzi or Calabria were hardy, having large leaves, small stalks, and an acrid flavour.

The Sabellian Coles, with curled and ruffed leaves, are mentioned as having a small stem, supporting heads of an extraordinary size; these were reputed the sweetest. The same author mentions a kind of Cabbage-Cole from the vale of Aricia, with an exceedingly great head and an infinite number of leaves, which gather round and close together; probably this was the first type of our hearting Cabbage. The Romans planted the sprouts as well as the young plants. Columella, one of their writers on agriculture, tells us that they should be removed from the old plants when they have attained six leaves. This method was described in one of our horticultural works, a few years since, as a grand *discovery;* so we may truly say, there is nothing new under the sun!

Columella informs us that this vegetable was so common in Rome as not only to be an article of food for the freemen, but also for the slaves. The ancients often used to steep their greens in oil and salt before they cooked them, and observed that if any brass pot or kettle was ever so much furred, and however hard to get off, if a cabbage was boiled in it, the fur would peel from the sides.

Ancient authors have mentioned various medicinal uses to which this plant was applied; and it is related that the Romans, having expelled physicians out of their territories, preserved their health for six hundred years, and soothed their infirmities, by using and applying this vegetable as their only medicine in every disease.

The Greeks as well as the Romans ate the leaves raw, to prevent the effects of excessive indulgence in wine; it was also thought to clear the brains of the intoxicated, and make them sober.

Pliny, in speaking of the spring sprouts of Cole, says: "Pleasant and sweet as these crops were thought by other men, yet Apicius (that notable glutton) loathed them. Drusus Cæsar held them in no esteem, while his father, the Emperor Tiberius, thought highly of them. I dwell long on this vegetable," says this author, "because it is in so great request in the kitchen, and among our riotous gluttons." It is related that a physician, having a mess of coleworts upon his table before him, and being suddenly sent for to visit a patient, he covered, at his departure, his dish with another, and found it, at his return, bedewed with moisture: observing this circumstance, he reasoned on the cause, and ultimately discovered the art of distillation.

The variety of Brassica which was first cultivated in England cannot be ascertained, but it is probable that one species was introduced by the Romans, since Kale is mentioned among the oldest English records. The Saxon name for February is Sprout-Kale, and that is the season when the sprouts from the old stalks begin to be fit for use; the Saxons must, therefore, of course, have been familiar with the culture of Cabbage or Kale, as it is not at all probable that they invented the name after their settlement in this country. As the Germans likewise cultivated the plant from remote times, they, as well as ourselves, might be indebted to their Roman conquerors for this vegetable.

Little can be said with certainty respecting the varieties of culinary vegetables cultivated in England previous to the fifteenth century. No doubt many kinds had been introduced by the Crusaders and others, but became degenerated or lost during the commotion caused by the wars of the White and Red Rose, which ravaged the country and reduced the inhabitants to extreme destitution.

Gerard is the oldest English author who has written fully on this useful vegetable; he notices several kinds. Among them, he says, "swollen Colewort, of all others, is the strangest, and which I received from a worshipful merchant of London, Master Nicholas Lete, who brought the seed out of France, who is greatly in love with rare and fair flowers and plants, having a servant at Aleppo, and in many other countries, for the which myself and likewise the whole land are much bound unto." The same author says: "Rapecole is another variety; they were called in Latin *Caulo-rapum* and *Rapocaulis*, participating of two plants, the Coleworts and Turnips, from whence they derive their name. They grow in Italy, Spain, and some places in Germany, from whence I have received the seed for my garden." "They must," says he, "be carefully set and sown, as must melons and cucumbers." The close-hearted variety, which is more peculiarly called Cabbage, was for many years imported into England from Holland. It is said that Sir Anthony Ashley introduced the cultivation of this vegetable into the country, and that there is a cabbage at the foot of his monument, at Winborne St. Giles, Dorsetshire. This tradition and the Cabbage has been the subject of controversy as to whether the sculptor intended the latter to represent that vegetable or a cannon-shot "with its surface ornamented with hexangular reticulations," as referring to the warlike deeds of the worthy knight inscribed upon the monument. I think, however, there is some truth in the story of the introduction of some kind of cabbage, supposed to be the Summer or Roundhead variety, by Sir A. Ashley; for, on referring to "Christie's Memoirs, Letters, &c., of the First Lord Shaftesbury" (vol. i. p. 3, note), it is stated that Sir A. Ashley held for many years the office of one of the Clerks of the Council during the reigns of Elizabeth and James I. Now, what could be more likely, as a writer in *Notes and Queries* remarks, than that, in the same age when Sir Walter Raleigh, who was member for Dorsetshire, introduced the potato from America, there should be a sort of rivalry among the distinguished members of Elizabeth's court in introducing foreign roots and plants, and that Sir A. Ashley should have obtained a variety of cabbage not before grown in England frome some of the ambassadors of the Low Countries? Late in life he inherited the estate of Winborne St. Giles, and became a liberal benefactor of the parish, rebuilt the church, endowed almshouses, and no doubt encouraged the cultivation of this universal vegetable. It is also stated in Gough's "British Topography" (vol. i. p. 133) that Sir A. Ashley had the command of Cales (Cadiz), where he enriched himself by peculations, for which he suffered imprisonment and disgrace for a time. This circumstance gave rise to the jest that he got more by Cales than he did by Kale and Cabbage. I think these notes go far to prove an historical fact. Hartlib (writing 1650) states that old men then living remembered the first gardener who came into Surrey to plant cabbage and cauliflowers, and to sow turnips, carrots, parsnips, and early peas, all of which at that time were great wonders, as having few or none in England but what came from Holland or Flanders. This gardener came from Sandwich, with cabbages raised from seed, brought from Artois by the Flemish emigrants in 1561.

Some writers hence thought that this vegetable did not become so generally cultivated for years after Gerard's time; but Johnson, who published the second edition of "Gerard's Herbal" in 1633, speaks thus of the garden Cabbage:—"This is the great ordinary Cabbage, known everywhere, and is commonly eaten all over the kingdom."

No doubt vegetables continued to be imported from Holland and other countries as they are in our own day, although in a less degree, and the quotation from Ben Jonson's "Volpone" (first acted in 1605), saying he had received intelligence from the Low Countries in cabbages, does not prove that they were a scarce vegetable in his day. One of the characters in the play just mentioned is Sir Politick Wouldbe, who, describing a newsmonger, says—

> "He has received weekly intelligence,
> Upon my knowledge, out of the Low Countries,
> For all parts of the world, in Cabbages."

No doubt the closely-packed leaves of this vegetable might be used as a convenient place for smuggling a secret letter over to this country in those days, and most likely it was to this circumstance that Jonson refers.

(*To be continued.*)

THE ICHNEUMON OF THE APHIS.

THE general habits and structure of the Ichneumonidæ are familiar to most naturalists. They are the weasels of the insect tribe, their bloodthirsty instincts being, however, of great economical value

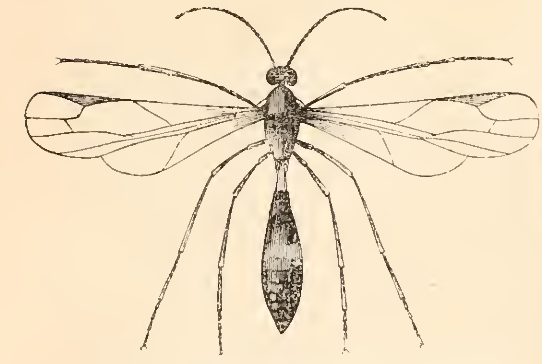


Fig. 116. Ichneumon of Aphis (*Ophion*) magnified.

in the balance of nature. Allusion was made by Mr. Southwell, in the last number of SCIENCE-GOSSIP, to the Ichneumon of the aphis. As less is known concerning this useful little insect than many of its fellows, we give an illustration of one. The aphides in which the characteristic Ichneumon is being hatched may be distinguished from their globular form. Indeed, the skin of the victim partially hardens over the parasite, and thus forms a tolerably protective cocoon. The specimen now figured was captured on some aphides that were preying on a *Pelargonium*. We would particularly draw attention to the near resemblance between this Ichneumon and the Winged Aphis.

The total length of the Aphis Ichneumon (*Ophion luteum*) is about a line. This genus of Ichneumons is distinguished from the rest by their sickle-shaped abdomens. Of all the friends to the rose-grower, not even excepting the Lady-

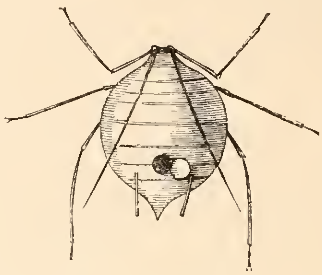


Fig. 117. Globular Aphis, showing where the Ichneumon has escaped.

birds and larvæ of the Lace-wing Fly, the *Ophion luteum* is most useful. The extraordinary reproductive powers of the aphides are well known, and were it not for the many enemies which find in them their staple food, very soon our planet would become their legitimate abode, to the exclusion of all other forms of life.

SPIDERS' WEBS AND SPINNERETS.

By H. M. J. UNDERHILL.

SOME years ago there appeared in SCIENCE-GOSSIP several articles on Spiders, their habits, anatomy, and webs. Interested in the latter subject from having prepared several slides of spinnerets, I wished to learn how the silk was produced, and therefore carefully re-read the articles in question, and also examined as many books as I could obtain at the Bodleian Library, in which information was likely to be found. Not learning all that I wanted, I resolved to investigate for myself, and therefore made various observations and dissections, the results of which I now detail.

To render intelligible the description of the several points which seem hitherto to have escaped notice, it is necessary here and there briefly to note a few things which are well known to arachnologists.

The exterior parts of the silk-producing organs are called spinnerets. They are four, six, or eight papillæ, or sometimes instead of papillæ, flat plates, situate on the under side of the end of the abdomen, in a little depression adapted to their size and shape. As far as I am aware, no British spider has a less number than six. On the ends of each spinneret are little funnel-shaped tubes (*a* and *b*, fig. 120) from which the silk is emitted, and which I call "silk-tubes," being ignorant of their proper name. The spinnerets lie in pairs, and are naturally divisible into two "sets," an upper and a lower. There are

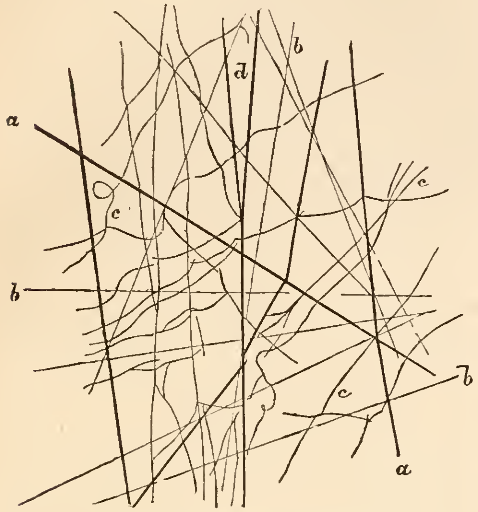


Fig. 118. Web of *Tegenaria domestica*, × 150. *aa*, first threads; *bb*, second ditto; *cc*, third ditto.

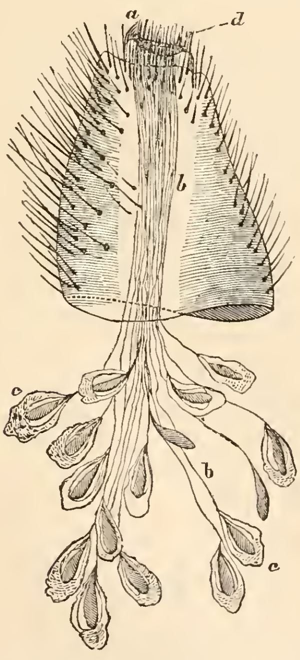


Fig. 119. Under Spinneret, with glands attached, of *Tegenaria domestica*, × 38. *a*, common silk-tubes; *bb*, ducts; *cc*, glands; *d*, silk-tube of unusual size.

two pairs in the upper set, one above the other, which I therefore name the first and second pairs; the one pair in the lower set being distinguished as the third pair. The first spinnerets, *i.e.* the spinnerets of the first pair, have two joints, and their silk-tubes are situated sometimes on the end of the second joint, and sometimes irregularly down its inner side. The second spinnerets have but one joint. They are smaller than the first, and have the

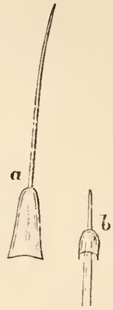


Fig. 120. *a* and *b*, silk-tubes of first and third spinnerets of *T. domestica.*

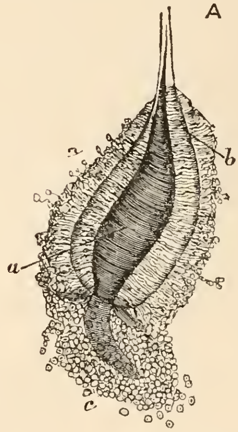


Fig. 121. Silk-tube, duct, and gland of the first spinnerets of *T. domestica*, × 38.

Fig. 122. Gland of third spinners, *a*, gland; *b*, bag or case; *cc*, coating of epithelial cells.

silk-tubes on and around the ends. The construction of the third pair differs a little from that of the other two. Like the first they have two joints, but the basal joint is always much larger than the terminal, which is very short. Their silk-tubes are on a retractile plate at the end of the second or terminal joint, which, when not in use, is drawn inwards until the tips of the silk-tubes are nearly level with the end of the spinneret. This plate has a thickened rim, and on the interior margin, where the rim is broadened for the purpose, are a few holes and two silk-tubes of unusual size. The exact use of these I have been unable as yet to determine. The spinnerets of a spider are mobile, and their movements are effected by longitudinal muscles.

The first and second spinnerets always produce plain or non-adhesive threads: if the spider be of a species that spins viscid threads, these are always emitted by the third pair. There is one family of British spiders which has an extra and very remarkable pair of spinnerets in the lower set, which produce threads of a peculiar character: they are described further on.

As may be supposed, I selected the commonest spiders for observation, and house-spiders happened to come handiest. The web of a Tegenaria, and I believe of every spider, contains three sorts of threads, not two only, as usually stated. Two of these are plain, and stretched taut from point to point (*a* and *b*, fig. 118), and they differ in nothing but size, being spun by the first and second spinnerets, of which in all spiders the first is larger than the second, although in some instances it has a fewer number of silk-tubes. The third thread (*c*, fig. 118) is exceedingly elastic, and studded with viscid globules, or, if these be absent (as in the web selected for illustration), it is slack, irregular, and sometimes much curled. The existence of viscid threads in a Tegenaria's web seems to me doubtful, for with a Smith & Beck's best quarter-inch objective (the highest power within my reach) no globules are visible, though several contributors to this journal have stated that they may be found. The thick threads which form the beams or foundation of the web, are spun by the first pair of spinnerets and are often doubled or trebled. This is especially the case at the edges of the web, where greater strength is necessary.

The apparatus by means of which a spider forms its silk is a series of glands within the abdomen, near and attached to the spinnerets, and immediately beneath the liver and intestinal canal. The glands of the upper and lower sets of spinnerets differ somewhat in character and shape, as is noted below. Fig. 119 is a drawing of one of the third spinnerets of *Tegenaria domestica*, with its glands, of which only a few are shown. These communicate with the silk-tubes by ducts (*b*). They vary in size in different individuals, but in a large Tegenaria $\frac{1}{100}$th of an inch is an average length. Each gland has its own duct and silk-tube. On the first pair of spinnerets there are about 60 silk-tubes; on the second pair, although the spinnerets are smaller, about 80. The silk-tubes on these two pairs are alike; but they differ in shape from those of the third pair and are much larger (see fig. 120, *a* and *b*). There are nearly 220 tubes on the third pair, thus making altogether about 360 on the six spinnerets.

The glands likewise, which are proper to the first and second pairs of spinnerets, differ from those belonging to the third. Fig. 121 represents one of them with its duct and silk-tube, drawn to the same scale as figure 119, for the sake of comparison. It is a simple sac, closed at one end, and terminating at the other in the duct, which carries the secretion to the silk-tube. On the surface of the gland is a coating of cells, probably epithelial, which are surrounded by a very delicate membrane. The points of difference in the silk-glands of the third spinnerets are these: they are smaller (about one quarter the length), of a different shape, and chiefly, they are enveloped by a bag or case interposing between the actual gland and the epithelium (see A, fig. 122, *b* and *c*) (which bag is wanting in the other glands), while the epithelium is apparently without the membranous covering by which in them it is always surrounded. This case continued as a tube surrounds the duct for some distance, in all probability as far as the silk-tubes, but I have not been able to trace it so far.

These distinctions in form and construction of the upper and under sets of spinnerets with their glands, prove, I think, the common idea that each of the threads of a spider's web is the joint production of the six spinnerets (from which it necessarily follows that their being viscid or plain depends merely on the will of the animal) to be quite erroneous; and on the contrary, they prove that each of the three sorts of threads which go to compose a web is the separate formation of one pair of spinnerets specially adapted for producing that one thread.

It has been argued that the drops of liquid silk coalesce as they emerge from the spinnerets, and so form a simple homogeneous thread, but various observations which have before been related in SCIENCE-GOSSIP, have convinced me that such is not the case. The following also tends to contradict this theory, namely—when a garden spider has caught a fly, as every one knows, she very expeditiously binds it in a covering of silk. Until I saw the exact process, I often wondered how she could manage to accomplish this so quickly. She places the tips of her six spinnerets almost in a line, at the same time seeming to erect each separate silk-tube, and thus puts forth, not a single thread, but a broad band of many detached threads, which is rapidly wound round the unfortunate fly. The examination of the web of a house-spider under a high magnifying power, will show that many of its main threads are frayed, like a rope worn by use; this could not occur if they were homogeneous.

MICROSCOPY.

HOW TO CUT LEAF-SECTIONS.—Mr. C. Stewart describes his mode of obtaining sections of fresh leaves as follows:—He inserts a piece of the leaf in a notch cut in a carrot, and then cuts slices through both carrot and leaf. The sections are afterwards soaked in water in a watch-glass under an exhausted receiver, stained with hæmatoxylon and transferred through water, absolute alcohol, and oil of cloves to the mounting medium. In the oil of cloves he found they would coil up if they were not prevented by a heavy cover-glass being laid upon them.

Origin of Blood-corpuscles.—Dr. H. D. Schmidt, of New Orleans, has recently published his observations on this subject. His investigations were directed chiefly to human embryos six weeks old and upwards. He states that the nucleus only of the colourless blood-corpuscles is developed into the red corpuscle, and confirms the prevalent opinion that the spleen and lymphatic glands are the permanent blood-formative organs. Dr. Schmidt regards the blood-corpuscle as a gland-cell destined to promote within itself the transformation, into other elements, of certain materials derived from the liquor sanguinis, and, when matured, as giving back directly to the "liquor sanguinis," by its final dissolution, its secretion, consisting of its own body.

Raphides.—I like to see these best in their natural position in the plant. Some will show by merely putting the skin between two glasses with balsam or water, or by peeling a piece of the cuticle off. The thin-coloured skin of the bulb of the hyacinth shows them very nicely, and so does the skin of the garlic.—*E. T. Scott.*

Polariscope Objects.—I don't know whether the objects are known, but I find that the hairs of *Lithospermum officinale* make beautiful polariscope settings. Those from the stem are best, and are easily detached by scraping. They are insoluble in pure nitric acid. In appearance they rather resemble the hairs of the stinging-nettle, appear hollow, and there is a bulb at the base, but the plant can be freely handled; so probably possesses no urticating properties.—*W. H.*

Straw Paper as a Polarizing Object.—A surgeon of some repute attending me during a short illness, seeing the microscope upon my table in one of his visits, made the remark of "How little practical use the instrument was in connection with the household." Coming from such a man, the observation set me thinking, and, feeling a little chagrined that any slight should be offered to my pet study, I afterwards made it a point of examining all objects of a common and suitable nature that happened to fall in my way, and I have found the microscope of much use in detecting many adulterations both in food and materials for clothing, though I fear I have not altogether made a "clear case" against my medical friend's remark. At the risk, however, of placing myself in the somewhat unenviable position of the grocer and his lump of sugar, I am induced to send you a slide of straw-paper that accidentally fell in my way, and which, from its appearance, seemed principally composed of straw fibre. On looking at it through a small lens, the thought occurred to me whether the structure and cuticle of the straw had been entirely obliterated in reducing it to the pulp for paper. On more minute examination with a half-inch objective, I found the straw had not been entirely broken up, while the cuticle was not difficult to be traced in many places. I need scarcely add that unless the straw can be thoroughly reduced to pulp, the material can only be used in the commonest or coarsest of paper. I afterwards tried the paper as a polarizing object, using blue and yellow selenite, and was so pleased with it that I am inclined to believe that had it formed one of the objects shown at the Quekett *soirée* it would have been found not the least interesting and attractive among some of the (perhaps *very* common) objects.—*Hugh Gilbert.*

Dammar Varnish.—In the January part of Science-Gossip (p. 18), your correspondent "F.K." says:—"My experience of soft cements is that in a shorter or longer period they almost invariably run in, and I much fear gum dammar will not prove an exception." Seeing this the other evening, on looking over the back numbers, I was induced to send, for the information of "F. K." and such of your readers whom it may interest, an account of the preparation of the gum-dammar varnish as used very extensively by Dr. Klein and other well-known histologists at the Brown Institution. The description of it is condensed from Sanderson's "Physiological Laboratory," the histological part of which is written by Dr. Klein:—Gum dammar, 1 oz.; turpentine, 2 oz.; dissolve. Gum mastic, ½ oz.; chloroform, 2 oz.; dissolve. The two solutions are to be separately filtered, and then mixed. As for its utility, the fact that it is *the* varnish in use at the Brown Institution, says more in its favour than I could if I wrote a foolscap sheet on the subject. But, speaking from experience, I must say it is far better than any I have ever used. —*F. C. S.*

Mounting Objects in Cells containing Fluid.—Prof. Busk describes, in the last number of the *Quarterly Journal of Microscopical Science*, his method of using cement for the above purpose. The advantage it possesses arises chiefly from the circumstance that it can be used under water or weak spirit, so that the cover can be affixed beneath the surface of the fluid, and thus the admission of air-bubbles can be effectually prevented. It has also the advantage of retaining its adhesive property for several days if requisite. The preparation (which may be termed "caoutchouc size") is prepared by melting pieces of caoutchouc in an iron or porcelain cup until it is reduced to the condition of a very viscid tar. As this tar, however, in its primitive state, is too viscid for use, it should be dissolved in benzine, so as to form a fluid of the consistence of thick gold size. When spread over the edges of the glass cell or vessel intended to contain the object, it should be allowed to dry for a quarter of an hour, by which time the benzine will have evaporated, leaving the surface exceedingly sticky; and this stickiness is not impaired by its immersion in water. Consequently, if the cell or vessel, with its contents, is wholly immersed, the cover may be applied and pressed firmly in its place while still under the surface of the fluid. No other fastening is absolutely required, but it is better when the surfaces are dry to apply a solution of shellac or other varnish round the edge of the cover.

ZOOLOGY.

British Association.—The meeting at Belfast, on the 19th of August, promises to be a very successful one. The President, Professor Tyndall (himself an Irishman), delivers the inaugural address, and Professor Huxley and Sir John Lubbock deliver the other two customary discourses. Excursions to all places of interest, such as the Giant's Causeway, Lough Neagh, Carrickfergus, &c., in the neighbourhood, are arranged for on the Saturday afternoon and the following Thursday, and, as is well known, these have a world-wide celebrity for their geological importance. In another part of our columns will be found an exhaustive sketch of this department of science, written by a competent authority, which we hope will be found useful to such of our readers as may be members of the Association. A new feature of interest this year is the room to be set apart for the exhibition of specimens and apparatus used in illustration of papers.

Natural History of Norfolk.—The Norfolk and Norwich Naturalists' Society stands foremost among the provincial associations of its kind for the earnest and excellent work its members have done within the few years of its existence. Starting with the idea that their duty was first of all to investigate the natural history of the county, they were enabled all the better to do this through having among their ranks gentlemen of well-known authority on several subjects. Among others, Mr. C. G. Barrett, the assiduous entomologist, had already done good work, not only in always being ready to help younger students, and as a reference to any difficulty arising in respect to entomology, but more particularly he had been noted for the exhaustive manner with which he investigated the Lepidoptera of Norfolk whilst he resided at Norwich. Many of his notes were published in the *Entomologists' Monthly Magazine*, and now we have the pleasure of drawing attention to the "Supplement" (of 80 pp.) to the "Transactions" of the Society, in which the lepidopterous fauna of Norfolk are minutely described, and many of their varieties noted. The lists and habitats are further enriched by Mr. Barrett's great knowledge of the literature of the Lepidoptera. No fewer than 1,240 species are thus enumerated, and entomologists generally will appreciate as they ought this important contribution to natural science.

"Birds and Primroses."—For several seasons we have been annoyed by finding the ground around our primroses, &c., strewn with their blossoms. Careful watching at last discovered the cause of the mischief. Chaffinches and other small birds were detected in the *act* of nipping off the flowers, and no doubt rested on our minds that their object was —as suggested by Mr. Darwin—to obtain the nectar. I may add that the flowers attacked were perfectly healthy: *we* saw no insects.—*H. M. C. Alten, Barcombe.*

Popular Science.—The *Popular Science Review* for July contains several valuable articles, all by eminent writers, to which we are anxious to draw the attention of our readers. Among others are to be noticed a fully illustrated paper on "Plumularians," by the Rev. Thomas Hincks, F.R.S.; one by Dr. Leith Adams, F.R.S., on the "Natural History and Geographical Distribution of Living and Extinct Bears;" and a third on "The Lichen-Gonidia Question," by the Rev. J. M. Crombie.

Noxious and Beneficial Insects.—The sixth Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri, by C. V. Riley, State Entomologist, has just appeared. Like the rest of these valuable reports which have been given to the world, the present is marked by careful observation, and details of the life-history of the insects, which cannot fail to be of great economical value. The illustrations are often of every stage, so that the recognition of the different species is rendered an easy matter for those to whom the report will be most useful. A word of commendation ought to be given to the artist for the excellent style of the illustrations.

Insects and Flowers.—I have observed this spring that the bees extract honey from the flowers of the *Wisteria* by drilling a hole through the calyx. I have seen the big bumble-bees drilling the holes, and the honey-bees making use of these holes. Whether the latter have strength to bore the holes I am not sure; but it is curious that they should not treat the honeysuckle in the same way. It would be easier to pierce the corolla of that flower than the tough calyx of *Wisteria*, and it would yield a more abundant supply of nectar. No doubt there is some reason why they do not, and perhaps you can inform me what it is.—*C. T.*

Skeletons of Small Animals.—I can recommend the following as a ready mode of obtaining the skeletons of small animals:—Remove the skin and as much of the viscera as possible, together with such portions of the flesh as are easily cut away. Then place the animal at a little distance from a wasps' nest; and, in the course of a day or two, the wasps will have cleared away all the remaining portions of flesh, so that with a very little further care and trouble the skeleton will be ready to set up.—*J. S. Tate.*

"SKELETONIZING."—In answer to "J. E. W.'s" inquiry, I would advise him to try the following plan, which I have proved to be most effective and simple:—Place two or three dozen mealworms, which may be obtained in a bakehouse or other place where meal of any description is stored, in a tin biscuit-box partly filled with bran; then let him adjust the specimen of which he is desirous of securing the skeleton upon a suitable stand, and introduce it, without skinning or any further preparation, into the midst of the bran, and I will answer for it that in a few weeks' time he will find as perfect a skeleton as he could wish, only requiring a slight finishing touch with a camel's-hair pencil. —*H. L.*

EGGS OF LAMPERN OR OF LAMPREY.—I have failed to obtain the eggs of the *Petromyzon fluviatilis* from our fishermen at Oxford, and have thought it not unlikely that the readers of SCIENCE-GOSSIP might help me to make sure of a supply next year. I am prepared to go to an expense of several pounds in order to secure an adequate series, and shall be very sincerely grateful for information which will enable me to carry out my object. My purpose is to study minutely the development of the eggs, and what I desire chiefly is to know with certainty *where*, and at *what season*, and precisely *how*, they may be obtained next year. Whilst asking for help, I may as well make another similar request, viz., for information as to the eggs of *Limax* and *Arion*. I have obtained them in quantity in Germany, but have never met with them in England.—*E. Ray Lankester, Fellow and Lecturer of Exeter College, Oxford.*

THE CANTERBURY TICK (p. 121).—The generic term *Argas* is derived from the Greek ἀργής, white, glistening. Certainly, being entirely eyeless, it can have nothing to do with him "of the hundred eyes." It is a most interesting creature, and I have long suspected it would turn up in England in some ancient dovecot, though little prepared to hear that it has lurked at Canterbury for a quarter of a century. Is the representation of the connection of the claws with the foot, at fig. 86, quite correct?—*W. W. Spicer.*

UNSUSPECTED PROPERTY OF THE STAG-BEETLE.—When we incautiously handle nettles, red ants, and certain hairy caterpillars, an irritating sensation is experienced, followed by more or less inflammation. This effect is said to be due to an organic acid, which, in the free state, produces that result on tender skin. Formic acid, so called from its being first discovered in the body of the red ant (*Formica rufa*), may be detected by simply holding the hand over an ant-hill; a peculiar tingling sensation is the consequence, accompanied by the pleasant aromatic odour of the acid. To examine the acid qualitatively a few of the ants may be digested with water; on filtering, and adding chloride of gold to one portion of the filtrate, the compound is reduced to the metallic state, carbonic anhydride being evolved. Another portion of the solution may be heated with concentrated sulphuric acid, when carbonic oxide is given off. These are the ordinary tests for formic acid. I am not certain if it is known to entomologists that the stag-beetle possesses properties analogous to the above. The beetle should be allowed to walk over the back of the hand, at the same time being gently pressed; the skin should then be rubbed with a piece of dry cloth. The hand soon throws out a rash, strongly reminding one of the measles. The question arose, which of the twenty-two movable claws were urticaceous? At the lower extremity of each tibia of the first pair of legs there is a movable claw; the tibiæ of the remaining two pairs possess two each. These are the only claws so disagreeably endowed. The attempt to discover an organic acid proved a signal failure, for when blue litmus-paper was pierced with these claws no acid reaction took place, indeed no fluid appeared to issue from the extremities at all. I experimented with a female stag-beetle from Kew Gardens. Nearly all beetles possess these movable claws; they are seen to perfection in such beetles as *Dynastes Hercules*, and certain members of the genus LUCANUS. The question is, are all clawed beetles gifted with similar properties, and is the effect due to formic acid?—*G. Halse.*

BOTANY.

SEASIDE PLANTING.—The following observations on this subject have been received from Mr. C. B. Saunders, nurseryman, planter, and florist, of the Cæsaren Nurseries, St. Saviour's, Jersey:—"*Atriplex halimus* is a plant of very vigorous growth, and is well adapted for planting in exposed situations near the sea; it grows in great abundance in the hedgerows in the Bay of St. Brelades, island of Jersey; its pretty silver-grey foliage recommends it very strongly to the admirers of variety in foliage; it thrives in most descriptions of soil, growing luxuriantly in sand, and with equal vigour in the strong loam of my nurseries. The propagation is most easy from cuttings of ripened growth under bell-glasses in the shade; associated with Elder, Tamarisk, the different varieties of Euonymus, Japonicas, the evergreen Oak, *Cupressus macrocarpa*, *Pinus Austriaca*, and the Silver Poplar, it forms a very pleasing effect, and well deserves the attention of all planters on the southern, western, and eastern coasts of England; the peculiar cylindrical and pyramidal form of the branches renders it less liable to be broken by the winds than most other plants, and, from the pliancy of the branches, it yields to the pressure of the gales off the sea, and resumes its erect form as soon as they have passed over. Being indigenous to a warm climate, it is liable to lose its foliage during the winter months, but its growth is so rapid in the spring that reaction commences almost as soon as it is denuded of its leaves, and it soon recovers its wonted beauty. It is desirable that in the selection of plants for sea-side planting, attention should be paid to their peculiar form of growth; the peculiar power of resistance which the Tamarisk (*Tamarix Gallica*) possesses is attributable to this; the *Cupressus macrocarpa* (broad-leaved Cypress) also presents the same form, and I know of no other conifers which resist the sea breezes so well as these two particular plants. It would appear that the battling of the wind tends to accelerate rather than diminish their growth, after they are fairly established in the soil; but as it is impossible to form a plantation of rows of trees with these shrubby-growing plants, we are obliged to have recourse to other descriptions of trees, and here of necessity attention should be paid to form, the pyramidal being the most acceptable, as being least affected, and of which the Guernsey Elm (*Ulmus sarniensis*) is a fair type, and recommends itself very strongly on account of its hardness and its very persistent foliage. The evergreen Oak (*Quercus ilex*) may also be strongly recommended, as, in addition to its pyramidal growth, or rather susceptibility of being kept in that form, and rapidity of growth, with the hardness of its foliage, it suffers less than most evergreen trees. The Black Austrian Pine (*Pinus austriaca*) is also a very hardy tree, and grows, in spite of wind and weather, in the most exposed situations, its long pliable leaves being a great protection to its branches, and its marked peculiarity of retaining its lower branches, so as to form a robust pyramid of growth, which is in reality the most acceptable of all forms." With the above observations Mr. Saunders writes:—"I have thousands of evergreen Oaks in pots, from one to six feet high, of pretty pyramidal growth. I also find I have six or seven dozen strong plants of *Atriplex halimus* in pots, and would engage to furnish any number of young-rooted plants at 1d. each by next Easter, if they were required, and early notice be given me. The seeds I have never been successful in saving."—*T. B. W.*, *Brighton.*

Mercurialis ambigua.—I lately found this plant on a spot in cultivated chalky ground, on the Brighton Downs, near the race-stand. It appears to be rare, as in Hooker's "British Flora" two localities only are given, viz., Jersey and the Isle of Wight. Sir William Hooker calls it a variety of the *Mercurialis annua*, adding:—"It certainly has a very different appearance, but Decandolle and most authors do not consider it distinct." It differs, however, from *M. annua* in being monœcious, having male and female flowers on the same plant, and is, as Hooker says, so different in appearance that it might well be called a distinct species. Withering does not notice it, and Wildenow refers to it as *M. ambigua*. (See Loudon's "Encyclopædia of Plants.")—*T. B. W.*, *Brighton.*

Sea-side Shrubs.—The variability of trees and shrubs, when planted on exposed sea-coasts, has been the subject of discussion in Science-Gossip for several of the last numbers. Premising the opinion that it is not the saline state of the air or soil that is *per se* the difficulty which the planter has to encounter, but that, whether on the sea-board or in the inland, a sufficiency of suitable soil and a degree of shelter are the two greatest requisites, we may mention, from our notes, the plants which we have ourselves remarked to flourish in more or less exposed situations on the sea-shore; and more or less luxuriantly. On the coast of Normandy, about Havre, may be well studied what trees and shrubs are likely to succeed on our own chalky southern coast. The Halimus grows well there, as also species of Ilex, Euonymus, Cornus, Arbutus, &c., likewise the red-flowered Horse-chestnut. On the English side of the Channel Tamariscus is seen at Margate and Hastings, and I dare say at many other places not noted by the writer. It is very large near the Lizard, growing on poor sand. We think Hippophae does not grow, at least wild, west of Kent. We noticed a luxuriant hedge of Halimus at Ventnor on the exposed beach, and another of Euonymus (*latifolius?*). *Ruscus aculeatus* grows in sand about Portsmouth, as does the Gorse, covered with the Dodder, there and at Land's End. Escallonia flourishes, as a garden plant, in the Isle of Wight, but not more luxuriantly than in the Isle of Man, where also occurs, of large size and almost naturalized, the Fuchsia. In this latter island, too, are seen growing in luxuriance the Tree-mallow, Buddlea, Hydrangea, often with blue flowers, large myrtles, and several genisteæ. Penzance, as well as Havre, is a good locality to ascertain what plants will thrive in sea-air. We noticed large aloes, tree-veronicas, mesembryanthemums, verbenas, daphnes, arbutus, escallonia, bays, fuchsias, giant-geraniums, myrtles, cistus, cape-jasmine, buddlea, laurestinus, pomegranate, and palms growing luxuriantly in the open air. The Fig seems all but wild north of

Hayle. But, what is more to the purpose, several of the willows and sallows grow well on the shore, the former becoming large trees. The Austrian Pine and Pinaster will form a fine grove. The Larch lives, but, instead of rising nobly aloft, becomes twisted in a very remarkable manner; and so with the Ash, for we noticed one at a farm-house near the Worm's-head, so horizontally bent that it covered over the farm-yard with its umbrageous branches, just above the heads of the hinds and cattle.—*R. G.*

Teratological Notes.—As an addendum to the very interesting paper on Teratology in your last number, I may mention that I found the other day a remarkable head of clover (*Trifolium pratense*). The calyx was normal; the standard petal of the corolla was much enlarged, and green and leaf-like. The other petals were reduced to scales, and within them, on a slight prolongation of the axis, was a whorl of tiny though perfect flowers about nine in number, apparently replacing the stamens. There was but a simple abnormal head on the plant.—*G. P.*

Hieracium maculatum.—In company with that detestable weed *Lactuca virosa*, this fine hieracium is still to be found in Chichester, where it was observed by Borrer—*floruit, floreat.* I believe that this is its only station in Sussex; but should like to know to the contrary. There are points of interest about this hawkweed, as will be seen by reference to Smith and Sowerby; and I shall be glad if any one, through the medium of Science-Gossip, will state other localities in which it *now* abounds.—*F. H. Arnold, LL.B., Fishbourne.*

A Wind-fertilized Crucifer.—At a recent meeting of the Linnean Society, Mr. A. W. Bennett exhibited drawings of the style, stigma, and pollen-grain of *Pringlea antiscorbutica*, Hook. f., describing the remarkable manner in which the pollen of *Pringlea* differs from that of other nearly allied Crucifers, being much smaller and perfectly spherical, instead of elliptical with three furrows. This he considered a striking confirmation of Dr. Hooker's suggestion that we have here a wind-fertilized species of a family ordinarily fertilized by insects, an hypothesis which is again confirmed by the total absence of hairs on the style of *Pringlea*.

GEOLOGY.

The Diamond-bearing Rocks of South Africa.—Prof. Maskelyne and Dr. Flight have recently read a paper on this subject at the Geological Society of London. The authors confirmed certain statements made by one of them from a superficial examination of specimens brought to this country by Mr. Dunn. The specimens examined and analyzed by Dr. Flight were obtained from various diggings and from different depths, down to 180 feet in the case of one mass from Colesberg Kopje. Their characters throughout are essentially the same. The rock consists of a soft and somewhat pulverulent ground-mass, composed of a mineral (soapy to the touch) of a light yellowish colour in the upper, and of an olive-green to bluish-grey colour in the lower parts of the excavations. Interspersed in the mass are fragments of more or less altered shale, and a micaceous-looking mineral of the vermiculite group, which sometimes becomes an important constituent of the rock, which also contains bright green crystals of a ferruginous enstatite (bronzite), and sometimes a hornblendic mineral closely resembling smaragdite. A pale buff bronzite occurs in larger fragments than the green form of the mineral; and in the rock of Du Toit's pan an altered diallage is present. Opaline silica, in the form of hyalite or of hornstone, is disseminated through the greater part of the rock-masses, and they are everywhere penetrated by calcite. The analyses of the component minerals (given in detail in the paper) show that this once igneous rock is a bronzite rock converted into a hydrated magnesium silicate, having the chemical characters of a hydrated bronzite, except where the remains of crystals have resisted metamorphism. Except in the absence of olivine and the small amount of augitic mineral, it might be compared with the well-known Lherzolite rock. The diamonds are said to occur most plentifully, or almost exclusively, in the neighbourhood of dykes of diorite which intersect the hydrated rock, or occur between it and the horizontal strata through which the igneous rocks have been projected. The authors compare the characters of the diamonds found in different positions, and come to the conclusion that their source is not very remote from that in which they are now found. The mineral above mentioned as resembling vermiculite is described by the authors as a new species under the name of Vaalite.

Geology of Barnet.—The geology of Barnet is on the whole rather uninteresting to the collector, but the deposits in its neighbourhood possess much interest to the student of physical geology. In reply to your correspondent K. Brierly, I may mention that he will meet with the following deposits in the neighbourhood of Barnet:—1. London clay; 2. Gravel and sand; 3. Boulder-clay. 1. The London clay forms the substratum of the entire country in the vicinity of Barnet, and although it is exposed here and there in brick and tile-yards and in the railway-cuttings (Great Northern main-line), it rarely yields many fossils. It is a stiff bluish-grey and brown clay, containing here and there bands of septaria or cement-stones. 2. The gravel and sand cap most of the hills at

Barnet and round about, but the gravel varies in different localities in its structure and composition, so much so as to lead some geologists to make two divisions; namely, pebble gravel and middle glacial: the whole of it is, however, older than the boulder-clay. The middle glacial gravel and sand underlie the boulder-clay of Finchley and Whetstone, and contain fragments of many rocks, of which flint, quartz, and quartzite are predominant, the flint being sub-angular and rounded; the gravel also contains numerous rolled fossils from many different geological formations. The pebble gravel is characterized by the very rounded nature of its materials, and is made up almost entirely of pebbles of quartz and flint. It caps the high grounds at Barnet and other places north of Finchley. I am not aware that any derived fossils have been found in it, and it would therefore be interesting if your correspondent found some. 3. The boulder-clay may be recognized by the occurrence in it of numerous pellets and boulders of chalk, which often give it a whitish appearance. It also contains unworn flints, and rocks and fossils from a number of geological formations. Mr. Wetherell, of Highgate, has made an extensive collection of British fossils from the boulder-clay and gravel of Finchley and Muswell Hill. It may be studied in the railway-cuttings near Church End, Finchley, and it is also scattered here and there over the country to the north. In regard to publications referring to the district, I may mention Mr. Henry Walker's pamphlet on the "Glacial Drift of Muswell Hill and Finchley," 1874 (price 6*d.*); also the Geological Survey Map, sheet 7, showing drifts, which in the neighbourhood of Barnet were surveyed by Mr. F. J. Bennett and myself, and Mr. Whitaker's "Memoir on the Geology of the London Basin." The two latter publications, albeit rather expensive, would be useful in long excursions, when the chalk and Reading beds displayed at South Mims and Northaw might be examined.—*Horace B. Woodward, Geological Survey of England and Wales.*

Fossil Oyster-bed.—A fossil oyster-bed has recently been discovered near Croydon; it extends over a considerable area, and lies about ten feet below the surface, in a stratum of clay, sandy loam, and pebbly gravel, locally known as pea gravel; the bed is a friable mass of shells and is only about seven to fourteen inches in thickness: some casts of oysters are very perfect, and several other species of shells occur, but not in such good condition. I have heard that a lobster has also been found in the same bed.—*E. Lovett.*

Geology of Barnet.—K. Brierly should get, or see sheet 7 of the Geological Survey Map, the last edition (with the drifts shown). The Memoir on that sheet is out of print, but the greater part of it is absorbed in a larger Survey Memoir "on the London Basin" (1872). A popular account of the Glacial Drift south of Barnet has been given by Mr. H. Walker, in a sixpenny pamphlet entitled "The Glacial Drift of Muswell Hill and Finchley" (1874), which K. B. would do well to get.—*W. Whitaker, Geol. Survey.*

Organisms in Carboniferous Flint or Chert.—In a piece of flint or "chert" derived from the Yoredale series of the Carboniferous system, I have met with some interesting microscopic organ-

Fig. 123. Fragment of supposed foraminifera in chert.

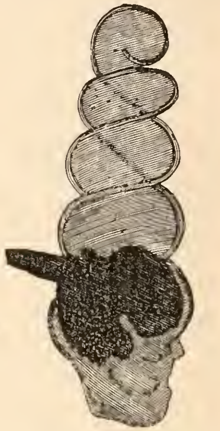


Fig. 124. Longitudinal section of ditto.

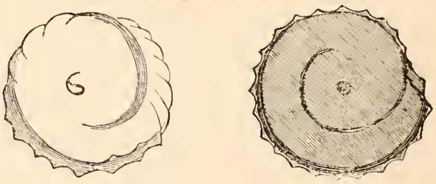


Fig. 125. Transverse section of ditto, all × 40.

isms, the nature of which I should be very glad to know. The two fragments seem to be portions of foraminifera, and possibly the others also. Perhaps some of the readers of Science-Gossip may be able to throw light upon this difficulty.—*J. S. Tute.*

NOTES AND QUERIES.

Variety of Lime Hawks.—"W. L. S.," on page 135, says he found in his breeding-cage a strange variety of the Lime Hawk, and then gives a description of the insect. From this description, I should most certainly conclude that the insect is *not* a Lime Hawk. Would Mr. Sergeant kindly inform me, through the Science-Gossip, whether the caterpillar and the chrysalid were the same as "limes" usually are. I think it is either entirely a new species, or else he must make a mistake in calling it "a perfect specimen of the Lime Hawk."—*C. B.*

Moths' Wings.—Under this heading, a correspondent in the June number asks whether moths fold their wings over their backs as butterflies, and goes on to say he caught what he thought was a moth, but it had this peculiarity. I would ask whether or not he examined the antennæ of this insect, and if he did so, where they pointed or clubbed? I consider you cannot tell a moth from a butterfly by any other means, and the only rule to take is "that the antennæ in a moth are always pointed, and in a butterfly are always clubbed." I saw a journal the other day, called the *Young Fancier's Guide*, in which several means were given for ascertaining whether an insect is a butterfly or a moth; amongst the list I noticed, they said, "a butterfly always folds its wings over its back, a moth never," or at any rate, something tantamount to it. Now I have caught moths with their wings folded in this manner, and therefore I must presume the author of the passage must have made a mistake.—*C. B.*

Cuckoos and their Young.—Last year a cuckoo laid its egg in an espalier apple-tree about four or five yards from our greenhouse-door. I do not know the name of the foster mother, but it was a small brown bird, a tree-creeper of some kind, not much bigger than a wren; the male had a long tail. We were looking over the tree when we saw the large red open mouth of the cuckoo. I gave it at the time a ripe raspberry which it ate, but I soon found that it did not quite like it, and I fed it with worms to help the poor foster mother, who had enough to do to get the cuckoo food. She would bring its food to it while we were standing quite near, and in a few days the cuckoo got quite to know us and looked out to be fed, and in the course of some two or three weeks it would climb about the tree, and allow itself to be handled without fear. When it got able to fly a little, it would always come with me when digging in the garden, and wait for worms to be given it; sometimes perched on the ground or on a stalk. In this latter position, it was curious to see its nurse feed it, being such a small bird. It used to come and perch on the cuckoo's back, and so feed it. When the cuckoo was well able to fly, it used at night to come after us to be fed, and then flew away to roost in some large ash-trees a little way off. In the morning it would come back to the garden, and would come when called. It would let us know when it was near by a peculiar noise, something like the scraping of a wheel, but very low. The birds did not seem to care much for it, but were all remarkably tame, and came to be fed quite as a matter of course. Robins and sparrows would all come at my call, and I have seen the robins take a worm away from the cuckoo. We never saw any appearance of the mother cuckoo feeding its young, though I fancy about the time when the cuckoos leave the country the mother used to come to see, I suppose, how the young one was going on. Long after it could fly it would allow itself to be taken off a tree into the hand, and to be carried about the garden perched on the finger. I am sorry to say that one day it disappeared, and we saw it no more.—*E. T. Scott.*

Green Caterpillars.—I should feel grateful to any of your numerous readers who can suggest some method of exterminating the green caterpillar which is now, and was last year, infesting the gooseberry trees in the gardens of myself and neighbours in the district of Clapham; they appear suddenly upon the trees and devour the whole of the leaves, and thereby cause the fruit to wither and fall off. Any suggestion that would prevent a recurrence of the plague, would confer a great favour on myself and friends.—*F. R., Clapham.*

The unknown Plants referred to in your last impression, page 165, and somewhat ambiguously described by your correspondent "K. F. L.," are probably: 1. *Listera ovata* (R. Br.), Tway-blade. 2. *Orobanche minor* (Sust.), a parasite upon the roots of clover principally. 3. *Allium ursinum* (L.), Ramson's garlic. Gerard in his work (1597), page 142, says he found the latter plant "in the next field unto Boobies' barn, under that hedge that bordereth upon the lane, and also upon the left hand under a hedge adjoining to a lane that leadeth to Hampsteede, both places neere London." Who can now point out those localities?—*B. M. W.*

Adder and Mole.—In the February number of Science-Gossip there is an account of the "Snake and the Toad," by M. A. Livett. I myself was once witness, some years ago, to an almost parallel incident. Being out one June afternoon in search of marl fossils at the base of the Downs, above Ventnor, in an angle of the Down, inclosed by two fences, and where the sun's rays poured down with unusual warmth, I encountered a large adder lying on the top of a stone that had fallen out of the fence above. At first sight I took it for a toad, but when it uncoiled itself, which it did when it saw me and tried to escape, I saw my error, and that it was the above-mentioned reptile, which had gorged itself with something that had caused it to resemble a huge tadpole in appearance. On the spur of the moment I threw my fossil-hammer at it, which completely disabled it; and on examining it I found that the creature had swallowed a full-grown mole, and when I disturbed it was in the act of taking its siesta after its repast.—*Mark W. Norman.*

Unknown Plants.—In answer to "K. F. L." in your last, *re* unknown plants. The first would appear to be *Listera ovata* or *L. cordata*, but "K. F. L." does not describe the leaves. If the writer is certain as to the second being an orchid, it may be *Listera nidus-avis*; but if not, I would suggest it being an *Orobanche* or *Lathræa squamaria*. He says, "growing in this neighbourhood," but the locality is not named. It is next to impossible to name plants upon such scanty data without seeing them, but if "K. F. L." will correspond with me, I shall be happy to do all that lies in my power towards helping him to recognize his specimens.—*H. Marshall Ward.*

Tachina Flies.—On three several occasions Tachina flies have been hatched from eggs of the squash-bug (*Coreus tristis*, De Geer). Is this fact commonly known?—*H. N., Knoxville, Tenn., U. S.*

Entomological Query.—There can be no doubt but that the wasp which Mr. C. Lovekin wishes named (page 118) is a species of *Pelopæus*, or mud-dauber, as it is commonly called. A detailed description of it can be found in Wood's "Homes without Hands," page 374. Pockard notices them also; the Tarantula-killer (*Pompilus fermosus*, Say) is also noticed in his work.—*S. M. B.*

Mouth of the Crane-fly.—May I beg the favour of your inserting the following errata with reference to my paper on the mouth of the crane-fly;

my manuscript was not perhaps so clear as I could have wished:—Page 156, col. 2, line 7, for "lettering" read "letter M"; page 158, col. 1, line 8, omit the word "of," inserting a comma after "centre"; page 158, col. 1, line 19, for "sets" read "setæ"; page 159, col. 1, line 23, insert the word "to" after "above"; page 159, col. 1, line 25, for "miscellaneous" read "membranous"; page 159, col. 2, line 2, for "element" read "aliment."—*A. Hammond.*

Lobsters.—A few days ago my wife having a couple of live lobsters, consulted a cookery book as to their management, and was somewhat perplexed at reading of the "frightful screams" these animals are said to give when plunged into boiling water, and the details of the manner of putting them into the pot in order to avoid such a very painful death. Can you or any of your readers tell me if these animals are capable of "screaming"? I was deputed to plunge them in boiling water, which I did, *head foremost*, and they certainly did not scream, although, much to my surprise, they scampered about in the pot for one or two seconds after complete immersion.—*R. Nelson, R.N., Botley.*

Worm-bait Anglers.—In some parts of Merionethshire anglers are catching trout in abundance with worm-baits, on clear and dry days, in shallow and clear waters, when other competent anglers are unable to do so with the same baits. It is the general belief about here that such persons use a kind of liquid to dip their baits in. I should be very much obliged to any of Science-Gossip's readers who would be so good as to inform me whether such liquid is used, and if so, what it is called and composed of.—*J. R.*

The late Rev. C. A. Johns.—Every reader of Science-Gossip will regret to hear that the Rev. C. A. Johns, author of "Botanical Rambles," "British Birds in their Haunts," "A Week at the Lizard," &c., died on June 28th at his residence, Winton House, Winchester. Not only his friends and relations, but every reader of his charmingly written books, will regret his loss.

Atriplex halimus.—The other day I met with the shrub (*A. halimus?*) growing profusely at Weston-super-Mare, on an embankment on the rise of the hill, near the pier. Worlebury Hill is composed of carboniferous limestone, and the Atriplex grows a fair height, besides being thick and bushy, and the foliage is quite unaffected by the strong sea breezes generally prevailing at Weston. I do not think it has been planted there many years. The leaves are somewhat sinuate and triangular, and have a frosted appearance. The shrub may perhaps be *A. hortensis*, if the latter is not a synonym?—*Lily Grey.*

The Starling.—In an article on the Starling in this month's issue of your journal it is stated that this is not a migratory bird. Reference to three books containing descriptions of the Starling, viz., Parley's "Tales about Animals," Stannard's "Common Birds," and Waterton's "Essays on Natural History," has shown me that this statement may be generally believed, for the migratory habit is not mentioned in any of them; hence my desire to establish it. In West Cornwall, my birth-place and residence for nearly twenty-five years, this bird is never seen in the summer, but it and the Fieldfare and Redwing come there in vast flocks in the winter. During about a year's residence at Bath, when in my thirteenth year, I was surprised to see the Starling building its nest under the school-house roof, my youthful imagination having conceived its breeding-place to be in some more remote region, along with the Snipe, Woodcock, Fieldfare, and Redwing. At Bath the migratory habit of the Starling was well known to the school-boys; when these birds assembled in large flocks previously to their departure the boys from Cornwall would loudly express their wish that they too could fly home in company with them. A marked decrease in the number of these birds in the neighbourhood of the school invariably followed these vast assemblages. The Starling also breeds here in Lincolnshire, but I do not notice any decrease in their numbers in the winter, similar to that observed in Somersetshire. Difference in size and beauty of starlings in full winter plumage was accounted for by school-boys by difference in age and sex, but Mr. H. H. Kew, an intelligent naturalist of this town, has shown me two stuffed specimens, which he names the "tree" and "house" starling respectively. The former is larger and has more beautiful plumage than the latter. Some starlings which built in some trees near the Hampstead-road, London, in the year 1858, appeared larger than those which build in my house here, and perhaps some of your readers may affirm the reality of the varieties named by Mr. Kew. I have often observed the trouble parent starlings take in carrying their young ones' excrement in their beaks to a considerable distance from the nest, e. g., thirty or forty yards, instead of dropping it immediately below. Query:—Is their object to prevent passers by from having their attention directed to the situation of their progeny?—*Palemon Best, M.B. (Lond.).*

The Colours of Flowers.—As an artist, and being in the habit of making life-sized studies of flowers, I must beg leave to differ with "W. C. S." in the *Floral Magazine*, as quoted in Science-Gossip for June. In the first place I think the colours at the disposal of an artist are not in any way inferior in brilliancy to those of flowers; they are the same as used in dyeing, and the hue of a new scarlet soldier's coat is more brilliant than that of a geranium or poppy, although not transparent. The real difficulty that arises is loss of brilliancy from want of gradation and quality; colours also, as every artist knows, gain much from contrast, and the fact of many coloured illustrations being on white background, and not over carefully coloured, combine to make them look poor. With respect to greens, it is an instructive thing to place a vivid bit of green in a bright green landscape, the stand of a toy-horse, for instance, on a green lawn, and the result will be to show how very little true green there is in the landscape, most of the shades looking grayish and indescribable by contrast. Of course really metallic lustre combined with vivid colour, as in the Adonis blue butterfly, foreign Buprestidæ, or Kingfisher, is not able to be fully represented by the limited *light* at the disposal of an artist, as their colour is enhanced by the refracted light.—*Harry Leslie.*

The Water Avens (*Geum rivale*).—This plant grows plentifully on the Itchen, at Wood Mill; and on the Basingstoke Canal, in Hampshire.—*Harry Leslie.*

Indiscriminate Collecting. — The London dealers have, I fear, something to do with the destruction of our fauna. When I lived at Deal I was told of two collectors who came down to get *Callimorpha dominula*, the scarlet tiger-moth, which they tried to destroy, collecting as many as six gross in a day or two; this fact speaks for itself.—*Harry Leslie.*

Lady-birds and Lady-bugs.—The Yankees call everything in the insect line "a bug," and say of an entomologist "I guess he collects bugs." The word was perhaps in frequent use among our ancestors who went there. In South Devon they called beetles "Ocops;" they were further divided into "Olly-ocops" and "Golden Ocops," the latter comprehending the more brilliant species. As is the case with local names, their application was very indiscriminate. I do not know what could have been the derivation of the word.—*Harry Leslie.*

Herring Gull.—The readers of Science-Gossip may be interested by the following observations respecting this bird, a tame specimen of which I possess. It is now two years old, having been taken from the nest and pinioned and kept in a garden until this spring, when I brought it into the fowl-yard, where it took up with the poultry. It was at first rather shy, and screamed whenever they approached him, but now he has got quite bold, and is able to beat the turkey-cock, seizing him by the tail, in fact he has quite cowed the fowl. His food is rather peculiar; being naturally a lover of fish and worms, he seems to have lost his taste for the former. I may here observe, as it has been often stated that gulls keep gardens free from slugs, that this bird would not look at one, having offered them to him continually; he threw them about with his beak, which he washed immediately, showing his utter disgust. His favourite food is the inside of rats and mice, which he nicely dissects, leaving only the skin; he also eats whatever is given to the fowl, meal, &c., picking up the grains of corn, which are scattered for them. His latest performance is to catch sparrows, which he kills and swallows whole; his way of catching them is like a cat, crouching down he silently pounces on his victim, which he immediately kills, holding it by the neck and shaking it violently. He is partial to eggs, devouring them whenever he can get an opportunity.—*Rev. S. A. Brenan, Pomeroy, co. Tyrone.*

Spiders and Chestnut-Trees.—Will some one kindly tell me if it is a fact that spiders will not spin a web on the wood of the chestnut-tree? The beams of the roof of Beaulieu Abbey are certainly free from a web of any sort, and the old keeper of the place assured me that this was owing to their being chestnut-wood.—*T. W. G., Alresford.*

Are Elvers young Eels?—This question was asked a few days ago in the columns of the *Western Daily Press*, and the following case shows that the lawyers cannot answer it:—"At the Gloucester County Petty Session, three fishermen were summoned, at the instance of the Severn Fishery Board, for catching the fry of eels, commonly called 'elvers,' between January 1st and June 24th. Mr. Henry George, the secretary, prosecuted, and Mr. Chesshyre, of Cheltenham, was for the defence. The case resolved itself into a question whether elvers are the fry of eels. Mr. George quoted from Acts of Parliament in the reigns of Charles II. and George III., wherein the fry of eels are commonly called elvers, and the brood of young eels as elvers. Mr. Chesshyre contended that it must be scientifically proved that the elvers were the spawn of eels, and the onus of proof rested on the prosecution, who had failed to do so. The magistrates held that the case was not proved to their satisfaction, and dismissed it. Notice of appeal was given."—*W. Macmillan.*

White Worms, &c.—Will any reader tell me the name of the small white worms that appear in the water in saucers under flowerpots, what causes them, and if they do any harm to the plant?—*W. D.*

The Holly.—In the May number of Science-Gossip, Mr. S. A. Notcutt, jun., makes some statements which are not strictly accurate. He will find *Ilex aquifolium* figured in the "national work," Symes's "English Botany," ii. 316. Even with us in the south it does not flower "in February," but at least two months later; this year it was fairly in flower about the first week in May. The "skilful botanist" can of course examine the flowers of the Holly at the time mentioned—in his herbarium.

A Feline Oddity.—At a town on the South Devon coast, I have recently seen a white cat with eyes of different colours, her right eye being a yellowish grey, and her left a bright blue; the owner informed me that the grandmother and the mother of the cat had the same peculiarity, the mother, however, was quite black; the cat is suckling a white kitten whose eyes are bright blue, like its mother's left. Can you or any of your readers state whether the peculiarity referred to often occurs? I do not see it alluded to in any of the seven vols. of "Science-Gossip" I have.—*W. R. L.*

Aquaria.—I have a small glass aquarium, and wish to stock it with small sea-fish, anemones, &c., but I find a difficulty in getting the former, even with a net, at low water on or between rocks. I have got anemones off the rocks, but they did not live in my aquarium more than a few hours. I think they stick so hard to the rock, that pulling them off injures or kills them; mine, when I put them into the aquarium, distinctly refusing to adhere to anything in it, and ceased to expand as they usually do. Perhaps you could let me have a few valuable hints as to how to rear things in an aquarium with success.—*Querist.*

BOOKS, &c. RECEIVED.

"Flora of Dorsetshire." By J. C. Mansel-Pleydell, B.A. Blandford: W. Shipp.

"Manual of Botany." By Robert Brown. London and Edinburgh: W. Blackwood & Sons.

"Grevillea." July.

"Journal of Applied Science." July.

"Popular Science Review." July.

"Monthly Microscopical Journal." July.

"Dr. Carrington's British Hepaticæ," part 2. London: Hardwicke.

"American Naturalist." June.

Communications Received up to the 12th ult. from:—F. K.—T. B. W.—H. E. W.—J. S. T.—H. L.—H. G.—W. W. S.—H. M. J. U.—W. H. B.—F. W. R.—H. B. W.—W. W. R.—F. H. A.—E. R. L.—H. M. C. A.—J. B.—W. H. W.—W. F. S. G. F. B.—C. F. B.—H. L.—A. S.—F. S.—E. H.—J. S. H.—H. M. W.—W. S. jun.—H. N.—S. M. B.—J. C.—A. H.—R. N.—E. L.—J. R.—E. W. jun.—T. B.—R. N. W.—M. W. N.—S. T. P.—L. C.—F. R.—C. L. J.—B. M. W.—E. T. S.—C. T.—C. W.—G. B. W.—H. E. W.—A. S.—T. McG.—T. P. B.—T. B. B.—E. M. P.—J. H.—A. L.—W. H.—F. H. A.—M. S. J.—J. S. H.—A. C. S.—E. E.—G. C. D.—H. P. M.—Dr. B.—R. M. B.—J. R.—T. W.—J. R. J.—E. L.—K. L. G.—S. A. B.—W. H. G.—R. G.—J. E. W.—G. P.—W. M.—W. W. S.—J. B.—A. C. H.—W. L.—G. H.—H. S.—C. T.—E. L.—T. B.—W. B. F.—E. D. M.—W. J. S. S.

NOTICES TO CORRESPONDENTS.

SPECIMENS.—We have to request the patience of various of our correspondents who have sent us specimens to name. This department of the Editor's duties has been greatly enlarged, and it is now impossible for us to insert all the answers in each month's number. We have many by us, ready for insertion, and others which are in the hands of such scientific gentlemen as gratuitously assist us in this department.

T. W. O.—*Grevillea* is edited by Dr. M. C. Cooke, and is published in sixpenny monthly numbers. You cannot do better than procure it for the purposes you name; viz, as the authoritative journal on all matters relating to micro-botany.

D. TRAVERS.—The specimen sent is a crystal of selenite (sulphate of lime), not of carbonate of lime, as you supposed.

T. SOMERS.—Newman's "British Moths" and "British Butterflies" are now published by R. Hardwicke, 192, Piccadilly, London, in parts or volumes.

R. T. W.—We cannot undertake to return rejected MSS. unless stamps are forwarded for the purpose.

SIGMA.—Get Staveley's "British Spiders," published by Lovell Reeve & Co. at 10s. 6d.

GEORGE M.—Your fossil is a coral, not a plant, and is called *Lithostrotion basaltiforme*.

P. Q. R.—Your mosses are as follows: No. 1, *Didymodon purpureum*; No. 2, *Dicranum rufescens*; No. 3, *Dicranum taxifolium*; No. 4, *D. pellucidum*; No. 5, *Tortula convoluta*; and No. 6, *Weissia cirrata*.

J. P. TAYLOR.—Get the new edition, with additional chapter on the Polariscope, by F. Kitton, or Lankester's "Half-Hours with the Microscope," London: Hardwicke. It will give you the best account you can obtain of the polarization of light.

EMILY T.—Your ferns are: No. 1, *Cystopteris fragilis*; No. 2, *Polystichum Lonchitis*; No. 3, *Lastrea oreopteris*; No. 4, *Athyrium filix-fœmina*; and No. 5, *Lastrea dilatuta*.

R. SCORESBY.—Consult Dr. Masters's "Vegetable Teratology" for anything relating to the monstrosities of plants. The work was published by the Ray Society, and is certainly not only the most exhaustive, but the most philosophical treatise on this difficult subject in the English Language.

COULD Mr. Barkas or any reader inform "W. M." where he could obtain the Stanhopescope lens (or a similar one) referred to in "GOSSIP" No. for October, 1866, p. 234?

L. S. and J. C.—The caterpillars of the Lackey-moth spin webs like those on the leaves of the Hazel. It was these, and not the caterpillars of the Processionary Moth, that had, doubtless, produced the "excrescences."

E. LOVETT.—It is not unusual to find fossils embedded in flint in the manner you describe; indeed, that is the normal condition in which they are found in flint. No geologist now doubts that the flint was originally soft and jelly-like. Your oolitic specimen is from one of the many beds in the "Portland Series."

G. F. BARKER.—Exchanges are not charged for unless they exceed the length of three lines.

T. BUCK.—The so-called "Unicorn's horn" is the single tusk of the male Narwhal (*Monodon monoceros*).

S. T. P.—We are sorry not to be able to insert your notices earlier, but we cannot depart from our rule of *priority*, except under unusual circumstances.

A. L.—Perhaps some of our bee-keepers will inform this correspondent what is "the best food for bees in a barren land, where no flowers are found for miles!" We get a good many natural history conundrums, but never had a more puzzling one.

W. LEE.—Your specimen is the Mouse-ear Hawk-weed (*Hieracium pilosella*).

T. COOPER.—The odoriferous orchis is the Sweet Conopsea (*Gymnadenia conopsea*); the other species is the common spotted orchis (*Orchis maculata*).

J. C. R.—No. 1 is a group of the "Oaten-pipe" Coralline (*Tubularia indivisa*); No. 2 the empty egg-cases of the common whelk (*Buccinum undalatum*); No. 3 the Elephant's-tusk shell (*Dentalium entale*).

G. GUYON.—The "masses of green jelly," &c., alluded to by this correspondent as being "attached to various sea-weeds," may be as follows:—The little sessile masses are the *oothecæ* or egg-masses of *Littorina*, and the pedunculated, of *Trochus*. When the former are placed in sea-water, the fry of mollusca appear: from the latter little oval bodies escape, which swim vividly by means of a circle of cilia, and have, apparently, two eye-specks. We think the ova of Turbo are deposited singly in sea-weed, and are somewhat hat-shaped in form.—*R. G.*

F. OSBORNE.—It is authoritatively stated (we have not tried the experiment) that the Japanese Lily (*Lilium aurantium*) will effectually keep away house-flies; at any rate, no one will complain of the sweet odours of this plant.

EXCHANGES.

WANTED, specimens of Conocardium for Silurian Fossils, by the Rev. W. H. Panister, 2, Belgrave-street, Derby.

DUPLICATES.—T. W. album, Villeda, Sylvata, Remutata, Pulveraria, Ulmata, Hastata, Templi, &c.—Jno. Harrison, 7, Victoria Bridge, Barnsley.

SHELLS OFFERED.—*Planorbis nitidus, Planorbis nautilans, Limnæa palustris, Limnæa glabra*, and *Ancylus lacustris*, for other good shells.—Lister Peace, Hebble-terrace, Bradford-road, Huddersfield.

GOOD Slides of *Eunotia sibrile* and *Coscinodiscus radiatus* for other diatoms.—Address, J. Redmayne, Astley Bank, Bolton.

SKINS of the Hairy-armed Bat (*Scotophilus Leisleri*) from Tanderagee, co. Armagh, for skins of other British Bats, Shrews, or Voles.—Richard M. Barrington, Fassaroe, Bray, co. Wicklow.

CHINESE SILKWORM.—A few chrysalides for distribution on receipt of box with stamps for postage.—W. H. Gomm, Somerton, Taunton.

SLIDES from the Microscopic Fossil Shells of the East Coast for other Slides, Books, or anything useful.—G. F. Barker, Abbey-walk, Great Grimsby.

W. M. has brought from abroad specimens, such as Ticks of Tiger, Black Bear, Deer, &c.; Parasites from Flying Fox, Snakes, and Vulture; Hairs of Indian Bat, Musk-rat, &c.; Diatoms of Sorts and Fresh-water Sponges. Would it be worth the while of any skilled mounter to allow "W. M." two mounted slides of each object, keeping remainder for himself?

I HAVE a spare slide of Diatoms from Norfolk.—Send good slide for 1-inch objective, not polar, to W. Sargant, Jun., Caverswall, Stoke-on-Trent.

FOR Spine of *Cidaris* (fossil), and Spine of *Erinaceus europæus*, send stamped directed envelope to E. Lovett, Holly Mount, Croydon.

FIRST-CLASS Micro Slides offered for Mole Crickets, Great Green Grasshoppers, Field Crickets, Locusts, or good Foreign Species of Grasshoppers, Crickets, &c. Any quantity during season.—C. L. Jackson, 11, Hesketh-street, Southport.

"POPULAR SCIENCE REVIEW" for Microscopic Slides or Apparatus.—C. W., 83, Union-street, Torquay.

BRITISH Shells for others. List exchanged.—R. Haynes, 3, Snargate-street, Dover.

A NUMBER of Microscopic Slides of Animal Preparations (Hairs, Palates, Bones, &c.), for Vegetable (Tissues, Fungi, and Lichens preferred).—Rev. G. H., 140, Kensington-Park-road, Notting-hill, W.

WANTED, small Stuffed Birds under glass shades. Various Curiosities of Scientific Books to offer.—F. Stanley, 4, Carroway's-place, Margate.

PACKETS of Sand containing variety of Foraminifera; also many Marine Objects of interest. Algæ, Living Ferns, Wild Plants, Mosses, Lichens, &c., for anything useful. Send stamps, —Address for full particulars, T. McGann, Burrin, Oranmore, Ireland.

MATERIAL and Slides prepared in the Mauritius, for Slides (named) and other material.—Address, Rev. A. C. Smith, Middlesbrough.

EGGS of Jay, Landrail, Wood Wren, Willow Wren, Chiff-chaff, Great Titmouse, Tree Sparrow, Garden Warbler, Stone-chat, &c., for others.—Chas. Bankart, Narborough, near Leicester.

EGGS of Raven, Cole Tit, Wood Wren, and others, for British Eggs. Unaccepted offers not answered.—G. B. W., Lindow Grove, Alderley Edge, near Manchester.

Colchicum autumnale in fruit, *Paris quadrifolia*, and *Cardamine amara*, for *Gagea lutea, Orchis latifolia, Linaria repens, Myosotis sylvatica*.—G. C. Druce, Northampton.

DRIED Specimens of 1051, 1054, 1059, 1060, 1062, 1041, 1032, 1093 (white), and 864, Lon. Cat., for 241, 244, 323, 337, 1069, 1070, and 1083.—Address, Mrs. A. Allen, Barcombe Rectory, Lewes, Sussex.

FOR Cluster-cups (*Æcm. epilobii*) send stamped envelope to T. Brittain, 52, Park-street, Green Heys, Manchester. No exchange required.

RARE SHELLS OFFERED.—*Helix obvoluta, Helix revelata, Clausilia dubia, Pupa pygmæa, Achatina acicula*, and *Succinea gracilis*, for *Pupa anglica, P. edentula, P. alpestris, P. substriata, P. pusilla*, and *P. Venetzii*, or *Testacellus* or *Succinea oblonga*.—W. F. Sutotn, Gosforth Grove, near Newcastle-on-Tyne.

DUPLICATES.—Imagos of *Cinxia, Z. trifolii* and *Statices*. Desiderata: other Imagos or British Plants named and dried. —Tunley, 9, Allez-street, Guernsey.

BRITISH PLANTS.—One or two good specimens of *Kobresia caricina* wanted. Will give good specimens of either of the following for them; viz., *Cyperus fuscus* or *Elatine Hydropiper* (L).—Walter W. Reeves, King's College, London.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. IV.—THE CABBAGE (*Brassica*).

(*Continued.*)

IT is recorded that cabbages were first introduced into the North of Scotland by the soldiers of Cromwell, who is stated, in Loudon's "Encyc. Gard.," to have been a great promoter of agriculture, and the useful branches of gardening, and encouraged his soldiers to introduce all the best improvements wherever they went; but in Johnson's "Useful Plants of Great Britain" the notion is contradicted, and an observation made that kale-yards were to be found round the Scottish houses centuries before the Roundheads crossed the Border. The colonies of German fishermen from Cuxhaven and the adjacent places, which peopled the coast of the central parts of East Scotland, are supposed to have brought with them their national love of brassica, and to have introduced some species of those plants, at a very early period, into this part of Scotland, which is more peculiarly "the land of kale." There the cabbage and open colewort are in equal favour, giving the name of kale to a soup of which they form the principal ingredients, the outside leaves and the stalks of the plants falling to the share of the cattle.

Many allusions in the old Scotch songs point to the fact of the country about Aberdeen abounding with this vegetable. In recommending the good fare of the country, the poet says,—

> "There's cauld *kail* in Aberdeen,
> An' castocks in Stra'bogie."

Cabbage-stems having the fibrous part peeled off, and the remainder softened by water, were called *castock*. Before the introduction of turnips into Scotland, this medullary substance of the stalks of brassica was very commonly eaten by the peasantry. The "Kale-brose o' auld Scotland" is celebrated to the same tune as the "Roast beef of old England," and though, with many other ancient peculiarities of the people, it has fallen into disuse, it is still considered a national dish.

A variety called cow-cabbage (*B. oleracea*, var. *arborescens*) was introduced some years ago from La Vendée by Comte de Puysage. The proximity of this department to the ancient province of Anjou, and the description of the plant, leaves no doubt of its identity with the Anjou cabbage, a very large variety described in Mill's "Husbandry," vol. iii. In 1827 thirty-six seeds were divided among six agriculturists for the purpose of raising this useful vegetable in England; some of the seeds produced plants of luxuriant growth. But it is in Jersey they are cultivated most successfully, and where they partake of a tree-like character, a peculiarity partly owing to the custom of the peasantry removing the lower leaves almost daily to feed their cows. Thus the cabbage-gardens in Jersey have somewhat the appearance of a little grove of palms. The average height of these plants is about six feet; but when grown in the shade are much taller. They are used for a variety of purposes: the stout ones are employed as cross-spars for the roofs and thatch of small farm-buildings, cottages, &c., and, if kept dry, are said to last many years. The smaller stocks are converted into walking-sticks (Jersey canes), look very nicely when varnished, and are largely purchased by tourists to the island during the summer months. Some of these walking-sticks are to be seen in the Museum of Economic Botany at Kew.

The cauliflower (*B. oleracea*, var. *botrytis*) is the most delicate variety of the Brassica genus. This vegetable is stated to have come orginally from Cyprus (where it is said to have obtained a high perfection) to Italy, from whence it moved slowly to the Netherlands, and reached England about the beginning of the seventeenth century. It was only seen at that time at the tables of the opulent. In the bill of fare for the inauguration of Dulwich College in 1619, two "colleyflowers" cost three shillings. The price of wheat at that time was 35s. 4d. per quarter. (See Eden, "History of the Poor.") Towards the end of this century this vegetable was brought to some degree of perfection, and appeared in our markets about that period. The importation of Dutch gardeners, and their style of gardening, then gave an impulse to English horticulture, and the reign of William III. produced not only the blessings of civil liberty to his adopted subjects, but taught them how to improve and appreciate the arts brought hither by his followers. In this the English succeeded so well that up to the period of the French Revolution cauliflowers were regularly exported from England into Holland, some parts of Germany, and even France.

Gerard, writing on this vegetable, says, "The white cabbage is best next to the coleflourey; yet Cato doth chiefly commend the russed cole; but he knew neither the whites nor the coleflourey, for if he had, his censure had been otherwise." But we find it noticed by the Roman herbalist of later days, who observes that "of all kinds of coleworts, the sweetest and the pleasantest to the taste is the coleflorie, although of no value in medicine, and unwholesome, as being hard of digestion."

The brocoli is considered a sub-variety of the cauliflower, and is scarcely distinguished botanically from that plant. The stem of the brocoli is rather longer, and the flower-heads smaller. They also possess a greater variety of colours, being sometimes quite green, as well as purple and yellow. A large number of forms are reared in our gardens. Kohl-Rabi is another singular variety; the stem is tumid and somewhat globose at the origin of the leaf, which gives it the appearance of a turnip. In its young state it is sometimes noticed as a vegetable, but is more generally grown for feeding cattle.

The well-known *sauerkraut*, of which the Germans are so immoderately fond, is merely fermented cabbage, which is cut into shreds, and placed in casks with a certain amount of salt, pepper, and a small quantity of salad-oil. It is then subjected to heavy pressure, and allowed to ferment: when the fermentation has subsided the barrels are closed up, and it is preserved for use. Before lemon or lime juice was introduced into our navy, *sauerkraut* was used for many years as a preservative from scurvy during long voyages. According to an article in the *Edinburgh Review*, vol. xc., a cabbage, when dried so as to bring it into a state in which it can be compared with other kinds of food, is found to be richer in muscular matter than any crop we grow, and no doubt the Irish kole-cannon (cabbage and potatoes beaten together) derives part of its reputation from the great muscle-sustaining power of the cabbage, a property in which the potato is deficient. A good deal of the nutritive matter is lost by cooking, or over-cooking; hence the reasonableness of the advice given by Pliny to drink the water they are boiled in, or to eat the vegetable uncooked.

Bartholine writes thus on this vegetable:—"The common cabbage of the country people is justly preferable to other pot-herbs, since, both raw and boiled, it is possessed of such salutary qualities as to prevent occasion for medicines used in the shops. For this reason, when a certain foreign physician came into Denmark with a design to settle, and saw the gardens of the country people so well stocked with cabbages, he, with good reason, prognosticated small encouragement for himself in that part of the world, and left the country to try his fortune elsewhere." Dr. R. James advises that cabbage should be eaten slightly boiled, as then it does not lose its grateful taste and salutary qualities. Sometimes cabbages are occasionally produced of an astonishing size and weight. Pliny relates that in Italy they were grown to such a size that the table of a poor man could scarcely support one. It is stated in the *Gardener's Magazine*, vol. iii., a cabbage-seed, accidentally among onions, came up in the bed, and without any care being taken of it, grew to very large dimensions, and weighed when taken up twenty-five pounds.

Last year (1873) a monster white cabbage was grown in a garden at Fakenham, Norfolk, which, as it stood, covered a space of land exceeding four feet in diameter, and the heart of which, stripped of its outer leaves ready for cooking, weighed 12½ lb., and measured 37½ inches in circumference; the diameter of the stalk, close up to the heart, measured fully 2½ inches.

The genus of Brassica is distributed over the temperate climate of Europe, Asia, and Africa. The cabbage, cauliflower, &c., are cultivated in some parts of India. On the Island of Desolation, a cold, barren, volcanic rock, situated in the centre of the Southern Ocean, grows a variety of this tribe, described by Sir W. J. Hooker in his "Notes on the Botany of the Antarctic Voyage." It is abundant near the sea. Its root-stocks are from three to four feet long, lying close to the ground, bearing at their extremities large heads of leaves, sometimes eighteen inches across, forming a dense white heart, resembling that of the common garden cabbage; it eats like coarse, tough, mustard and cress. But what a grand provision of Providence for the crews of ships touching at such a barren locality! Phillips states that the Roman name

Brassica came, as it was supposed, from *præseco*, because it was cut off from the stalk.

The cauliflower was first called "cole-florie," and is said to be derived from *caulis*, a stalk, and *fero*, to bear. Cabbage is stated to be derived from an old French word, *cab*, a head,—that is, formed by the leaves turning close over each other. Thus we say "the lettuce has cabbage," &c.

From this arose the cant word applied to tailors, who formerly worked at the private houses of their customers, where they often were accused of cabbaging, which means the rolling up pieces of cloth instead of list and shreds, which they claim as their due. The cabbage is a favourite vegetable among the labouring and lower classes in this country. It is calculated that more than eighty-nine millions of plants are sold annually in the metropolis, and over fourteen million heads of brocoli and cauliflowers. (See *London Labour and London Poor.*) H. G. GLASSPOOLE.

HOLIDAY RAMBLES.

NO. I.—A VISIT TO CASTLETON.

WHAT reader of "Peverel of the Peak" has not wished to visit the castle rendered famous by the pen of the great novelist, and to see for himself the home of honest Will Peverel? But great as the attraction of these ruins undoubtedly is to the antiquary, equally great are the attractions of Castleton and its neighbourhood to the geologist; for here are those wonderful caverns that have long been a cause of admiration; and here also, the strata of the lower carboniferous rocks may be studied with the greatest advantage.

In approaching Castleton from Chapel-en-le-Frith, the pedestrian notices, on reaching the brow of the hill from which the Vale of Castleton is first seen, Mam Tor, or the "Shivering Mountain." The former name was given it by our Saxon forefathers, which signifies "The Mother Hill." The latter designation has been bestowed upon it because, on its western side, large masses of its rocks have fallen down, and small fragments are continually sliding down; thus giving it the appearance of continual motion.

At this hill the Yoredale* limestones and shales may be well examined, as they have been thoroughly exposed by the landslips that have taken place. These beds will be found to consist of siliceous sandstone and shale, the latter being impregnated with oxide of iron. In some of the nodules of impure ironstone I found, on breaking them, cavities containing dried bitumen; whilst in the shale I discovered a few fossils, several specimens of a species of *Modiola* and *Goniatites reticulatum.*

* So called from the valley of the Ure, or Yore, in Yorkshire, where the typical beds occur.

On the opposite side of the road is Blue John Mine, the grand depository of the amethistine, or topazine fluor spar of mineralogists, which is called by the miners "Blue John," to distinguish it from "Black Jack," or zinc ore. This substance is composed of lime and fluoric acid, the most penetrating and corrosive of any acid known; the blue colouring matter being oxide of manganese.

Descending by a flight of steps, a narrow confined passage is reached that winds between stupendous rocks. From the roof of this passage stalactites are pendent, whilst the sides are coated with crystals of carbonate of lime, and in them various fossils are seen imbedded. After descending for some time, the Variegated Cavern is reached, a large chamber said to be upwards of 100 feet in height. But this is not the only large chamber that has been made known through the labours of the miners. Some distance from this cavern is the one called "Lord Mulgrave's Dining-room," a huge cavity about 150 feet in height and 60 feet in diameter. But the most beautiful of all the chambers is that called the "Crystallized Cavern," a large dome-shaped cavity, the height of which is estimated at 100 feet, and whose sides are adorned with numerous stalactites, that sparkle like stars when it is lighted up.

Another of the Peak mines is the Speedwell Mine, which was originally excavated by a company of proprietors in search of lead ore. Access to the interior of this mine is obtained by descending upwards of a hundred steps, and then by navigating a canal six or seven feet in breadth, the terminus of which is the Grand Cavern, a vast opening fashioned by nature in the heart of the mountain, the height and depth of which have never been ascertained. Here is a huge abyss into which 40,000 tons of rubbish, produced in driving the level or canal 600 or 700 yards beyond the cavern, have been thrown without making any difference.

The height of the huge dome has never been determined, but the distance to the surface of the mountain has been computed at 840 feet, and nearly the whole of the intervening space is believed to be a vast cavity. But some idea of the altitude of this cavern may be formed from the fact that rockets have been sent up within it having sufficient power to ascend 450 feet, which have exploded and thrown out their coruscations as freely as if they ascended beneath the vault of heaven.*

But the grandest of all the Castleton caverns is the "Peak Cavern," the approach to which is by a narrow ravine, at the end of which is a magnificent archway in the solid rock, 120 feet wide and about 42 feet high. The mode of progress in this cavern was formerly by a boat for a short distance, but

* See J. E. Taylor's "Geological Essays, and Sketch of the Geology of Manchester and the Neighbourhood," p. 95.

latterly a passage has been made by blasting for the convenience of visitors. After proceeding for some distance, a large chamber, called the Grand Saloon, is reached, about 220 feet square, and in some places 120 feet in height. Leaving this apartment by means of a steep and rugged pathway, the Chancel, a naturally-formed gallery, is reached, and then descending by another path, the visitor arrives at the Devil's Cellar. The other large chambers in this cavern are Gloucester Hall and Great Tom of Lincoln, the latter being so designated from its having a regular concavity in the roof resembling the form of a bell.

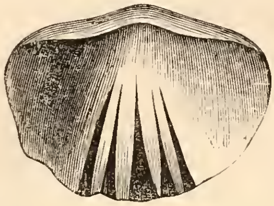


Fig. 126. *Rhynchonella pugnus*—Dorsal aspect.

On the eastern side of the Castle Hill runs Cave Dale, a rocky glen, in which the mountain limestone is well exposed. The approach to this narrow defile has rather a forbidding aspect, the entrance being by a cleft in the mountain not more than five or six feet in width, which is guarded by a mass of toadstone. Passing this, the dell is found to be hemmed in by great masses of mountain limestone, in which specimens of *Rhynchonella pugnus*, *Terebratula hastata*, *Cardiomorpha oblonga* (?), and several species of *Producta* abound; and from the shales which occur there a small *Conocardium* or *Pleurorhynchus* is obtained, whilst *Orthis resupinata* is frequently met with at other localities in the neighbourhood.

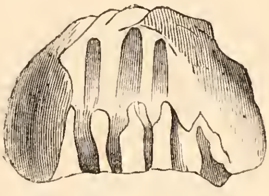


Fig. 127. *R. pugnus*—Front view.

Rhynchonella pugnus (fig. 126) differs from *Rhynchonella pleurodon*, another local typical fossil, by having from three to five ribs in the mesial fold and sinus, and the remaining portion of the shell is smooth, whilst the last-named fossil has from three to seven ribs in the sinus which radiate from the beak. *Terebratula hastata* (fig. 129) is frequently found with its bands of colour preserved, showing that the carboniferous seas in which it lived did not exceed fifty fathoms in depth. *Orthis resupinata* (fig. 130) may easily be distinguished by its fine striæ and two or three transverse lines of growth. *Cardiomorpha oblonga* (fig. 128) belongs to the Conchifera, and is a large shell, smooth, wrinkled, and with a few transverse lines.

Another place in the neighbourhood well worthy of a visit is the Winnats, or Windgates, a narrow defile between lofty limestone cliffs, through which the turnpike road to Manchester formerly ran. Wild grandeur and stern magnificence are the characteristics of this gloomy pass: on each side stupendous piles of mountain limestone rise to a great height, their summits split and rent into a

Fig. 128. *Cardiomorpha oblonga.*

variety of fantastic forms: in some places huge buttress-like masses protrude into the road, whilst in others lie shattered fragments of rock, which having become detached from the mountain above, have been hurled down, and are seen scattered about in wild profusion; whilst, at the lowest part of the defile, a gigantic pile of rock, round which the road winds, appears to oppose a barrier to all further progress.

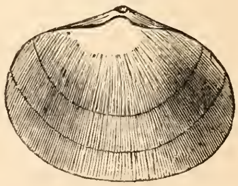


Fig. 129. *Terebratula hastata.* Fig. 130. *Orthis resupinata.*

Opening out from the Vale of Castleton are numerous little dales of great loveliness. The origin of these may be traced to denudation; the action of water having, in the course of ages, swept away the Yoredale shale where it occurred, leaving the harder rocks which form the hills *in situ*. To this cause the origin of most of the undulating scenery of Derbyshire must be attributed; the streams that descend from the heights having first undermined the softer strata and then carried them away. Good examples of this action of water may be seen on the lower flanks of Kinder Scout, and notably at Mam Tor; and where only the lower limestone beds occur, it is not doubted that water has been the chief agent in excavating the dales, first by cutting out subterranean channels for itself along the joints of the limestone, and then, the roof of the cavern having falling in, by gradually widening the caverns, and so converting them into dales. Good examples of this kind of action are to be seen at the base of Ingleborough, in Yorkshire.

Sufficient has been thus said to show that in the neighbourhood of Castleton there are spots replete with interest both for the palæontologist and for the physical geologist, since both will find in this beautiful portion of our country localities where opportunities are afforded for studying the fauna and the physical structure of the carboniferous system from the millstone, or Kinder Scout grit, down to the lowest beds of the mountain limestone.

[The student who desires thoroughly to investigate the locality touched upon in this paper is strongly recommended to consult the Memoir upon the Lower Carboniferous Rocks of the Geological Survey, published by Longmans.]

REV. W. H. PAINTER.

THE FORM OF THE DIATOM FRUSTULE.

THE forms of the Diatom frustule frequently offer difficulties to the young student of these organisms. I am frequently asked to identify forms with which the finder is already acquainted, the reason being that the frustule lies in an unusual position. If the form of the diatom-valve had been rightly understood, this difficulty would not have occurred.

A frustule consists of two valves and a connecting zone or band; a pill-box with lids affords perhaps the most familiar idea of the diatom cell. The lid or valve of the diatom, unlike the pill-box lid, consists of one piece only, and is more or less convex. The discoid forms offer little difficulty, with the exception of the Campylodisci: in this genus the valves are twice bent in opposite directions, and in consequence of this double flexure all the valves of the Campylodisci are necessarily circular. The Naviculæ are also easily understood. The valves of the lanceolate and linear forms are more or less canoe-shaped and more or less deep; the orbicular being much shallower than the linear or lanceolate forms.

The most difficult forms to understand are those belonging to the following genera:—Amphora, Cymbella, Amphiprora, Nitzschia, and Surirella.

The first three forms belong to the Naviculoid group: in Navicula we have the zone connecting the two valves of equal width all round the frustule, a central median line, a central and two terminal nodules; in Cymbella we find a departure from the true Navicula, the margins of the valves are dissimilar, one side being convex and the other straight or concave, the median line and nodules are more or less sub-central, the connecting zone is no longer of an equal width all round, but is narrower on the concave side; in the genus Amphora the median line and nodules are in some cases almost marginal, and the connecting zone so much widened out at the convex margin that both valves of the frustules are visible at the same time.

The genus Nitzschia is distinguished by the longitudinal keel-like elevation of the surface of the valve. This is, however, never central; in some forms it is marginal, and in others sub-central; the connecting zone is not perpendicular to the margins of the valve, but is produced in an oblique direction.

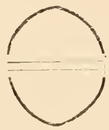


Fig. 131. Section of *Navicula*.

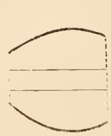


Fig. 132. Section of *Cymbella*.

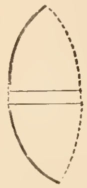


Fig. 133. Section of *Amphora*.

In the genus Amphiprora we have a true Naviculoid type, the valves more or less deep, the median line (or rather keel) central and sigmoid, the connecting zone of equal width all round.

In Surirella we find a great diversity of outline. In *S. intermedia* the valve is narrow and sigmoid; in some of the varieties of *S. fastuosa* they are nearly orbicular; the connecting zone is of nearly equal width all round the valve (in some of the ovate forms it slightly decreases in width as it approaches the small end of the valve). The principal characteristic of the Surirellæ is the more or less produced margin forming a frill round the edge of the valve.

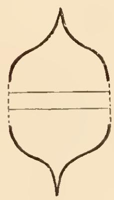


Fig. 134. Section of *Amphiprora*.

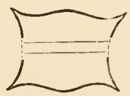


Fig. 135. Section of ~~*Nitzschia*~~.

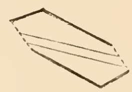


Fig. 136. Section of ~~*Surirella*~~.

The above diagrams will perhaps make the foregoing remarks clearer. They represent ideal sections of the frustules of the different genera; the dotted lines represent the connecting zone; the faint transverse ones the lines of suture or the place where self-division occurs; and the thick black lines the valves:—Fig. 131, section of Navicula; fig. 132, Cymbella; fig. 133, Amphora; fig. 134, Amphiprora; fig. 135, Nitzschia; fig. 136, Surirella. —F. K.

"OUR JIM."

THE MANCHESTER FIRE-DOG.

WHERE he came from we never knew, except that some of his relations evidently were black-and-tan English terriers. All we ever ascertained was he came hungry and apparently homeless. Two pounds of tripe cuttings very quickly seemed to satisfy, first his appetite, and secondly his opinion that the location he had selected might have been worse. In a few days he became a great favourite, by his affectionate, funny ways amongst the firemen, who christened him "Our Jim."

Soon after his appointment to the chief station as "Fire Dog," a noisy fellow ran into the yard giving notice of a fire at a chemical works: the man seemed to think that by making a great noise it would expedite matters. The dog seeing the man in a state of great excitement began to bustle about with the firemen, and add to the confusion by barking. He attended this his first fire—it was an oil-store. Wherever the firemen went the dog followed. Where he could not run he swam in the oil, and we often say this was his first baptism at a fire. He was exceedingly anxious to do his best to make a favourable impression upon those he had elected to serve. He seldom left the station, and had at all times an utter contempt for any strange dog that took the liberty to wag his tail at a fireman. Shortly after his first turn-out to a fire, a policeman ran into the yard one night, springing his rick, and shouting "Fire! Fire!" The dog was, at the time, sleeping in the superintendent's bedroom. He immediately jumped through the window and alighted on the window-sill outside, where he commenced barking at the pitch of his voice. At this time the firemen were warned on the occasion of a fire by the ringing of a two-hundredweight bell, and many scores of times has "Our Jim" given the alarm to the firemen living in the neighbourhood, by running round their houses barking, what the men used to call his "Fire Bark," long before the man on duty had received orders to ring the bell. Our Jim's fire-barking is quite a distinct sound from his ordinary barking. So satisfied are the men that the dog is giving notice of a fire, that they now turn out of their beds and attend the station, with as much confidence of there being a fire as if their bell were rung to give them notice of one. The horses, too, soon began to understand the dog's barking, and they, like the firemen, when lying down, will get up, shake themselves, and look round ready for the firemen to harness them.

After two or three years attending fires and false alarms, Our Jim gained considerable experience in his duties, and became with the public generally a great favourite, the latter acknowledging him as the Manchester Fire-Dog. On the road to a fire he is found most useful in warning gaping or sluggish drivers from the path of the fire-engine. At fires he is even more useful, for he frequently diverts the bystanders' attention, and keeps those who are too often meddling busybodies quiet by his antics, first running anxiously after one fireman, then another, stopping to assist the police to keep back the crowd of admiring boys, or to snap at a leak in the hose, or any one standing on the pipe, which always much annoys him.

In the year 1866 the fire brigade of Manchester removed to their new quarters in Jackson's-row. At the entrance is the inquiry office, adjoining is the firemen's waiting-room, in which are kept the telegraph instruments and bell-pulls, which communicate to the bells in the houses of the firemen living within the yard. Between these two rooms, divided by doors only, is the private office of the superintendent. It is in this office Our Jim is generally to be found reclining, by day, on his couch, resting himself after some hard fight at a night fire, or gaining strength to combat one. His experience has prepared him for any moment. Occasionally he, like the firemen, gets wounded; in such cases he remains bandaged, poulticed, or plastered, until he considers himself fit for duty, or is declared so by his medical man, the veterinary surgeon. When he considers himself in working order, he takes notice of his self-imposed duty by being always on the alert for telegrams or verbal messages. When the superintendent's office-door is shut, no human ear is sharp enough to hear the tinkling of the telegraph bell. But Our Jim hears it, and, what is more, decides whether or not it is to give notice of a fire. Immediately he hears the bell ring, he informs the superintendent by looking up in his face. Our Jim then listens for a moment or two, so does the superintendent, but not a sound can he hear. Not so with the dog; he quickly decides by either lying down again, and thereby giving those in the room to understand that he believes it to be only an ordinary message, and invariably he is right. On the other hand, Our Jim has made up his mind that it is a fire; he then commences to bark his fire-bark, scratches at the door, and waits for the fireman on duty to inform the superintendent of its whereabouts.

The instant the door is opened by the fireman, out springs Our Jim. The alarm is given by him to the men; the firemen and horses wait for no other intimation; the men begin to dress themselves and harness their horses ready for the fight, and in less than two minutes after Our Jim is leading the way, followed by the horses, who are as well aware as himself of their errand, drawing a clean bright engine, on which are mounted a company of firemen, to the scene of some fire. There is just one objection to Our Jim's actions: on notice of a fire being received, the neighbours have learned to know the fire-bark. The result is they leave their houses, the workmen their work, whilst the public-house close by gets emptied of its company through the fire-bark, and all help to swell the crowd which assembles, and very often impedes the actions of the firemen at a fire. On the men's return from a fire, it is usual, if they are wet or have had very arduous duty to perform, to give them refreshments.

Our Jim asks for his refreshments by putting out his tongue and licking his lips night or day. Jim is always served out with his refreshments, if the men have theirs; but sometimes he takes pains to let us know that he is entitled to them whatever we may think about the matter, and he is generally successful in his application. His refreshments finished, he next informs us that he wants his bath; that completed, he retires to the office to rest himself and watch for the next turn-out, whether it be to a mill, warehouse, or cottage, it is all the same to him.

Our Jim is now turned twelve years of age. He is nearly blind; his whiskers are grey, and although he has met with many accidents, and upon his body there are many honourable scars, still he is very active. His friends, the firemen, are proud of their old dog, and well they may be, for many a time have they been some little distance from the station, and by his fire-bark they have received timely notice that has enabled them to be in time to attend with the engine, from which, had it not been for him, they would have been absent. A. TOZER.

Chief Fire Station, Manchester.

SUDDEN APPEARANCES OF PLANTS.

MR. J. E. ROBSON has called attention (SCIENCE-GOSSIP, No. 112, p. 91) to the curious statement of Macaulay that the next summer after the battle of Landen, in the Netherlands, millions of poppies, "fertilized by twenty thousand corpses," covered the ground on which the battle had been fought. I think the circumstance may be accounted for without taking up the poetical idea that "the earth was disclosing her blood and refusing to cover her slain." Of course after the battle these "twenty thousand corpses" were all buried, and the soil must have been turned up to a great extent. In all probability the fight took place among corn-fields, where poppies had long flourished among the corn, and their seeds left in the ground were greatly dispersed in the turning up of the soil to bury the slaughtered combatants. The spilling of the blood of the soldiers would not have been a sufficient cause for the appearance of the poppies *unless the ground had been disturbed*. No doubt the poppy that thus presented itself was the common corn-poppy, *Papaver rhœas*.

An appearance analogous to this, though without the battle, came under my view a few years since when the Severn Valley Railway was constructed. Between Stourport and Bewdley, Worcestershire, the line passed through arable fields upon a sandy soil, and partly in cutting. The year after the ground was thus excavated, the mass of scarlet poppies (*P. rhœas*) that lined the embankment for miles was wonderful to behold, the seeds of poppies that had probably remained dormant for some years having been widely thrown about by the operations of the navigators, and urged into vitality. Yet strange to say, though doubtless most of these poppies produced seeds, yet this profusion, that astonished the eye at the time, has not been maintained.

It appears to be a law of Nature, that wherever the ground is freshly turned up and not planted by man, vegetation of some kind shall take immediate possession of the vacant space; and if seeds should be there lying dormant, they start up into life with meteor-like rapidity. A few years since the tenant of some meadows by the side of the river Teme at Powick, three miles from Worcester, threw up an embankment to keep out the water of the river when freshes occurred. The next year I was surprised to see the new embankment covered by a most profuse growth of *Cardamine impatiens* all along it. But what perhaps is most remarkable is, that these armies of plants thus suddenly appearing are unable to maintain themselves and keep their position, but gradually disappear. Not a single plant of the *Cardamine impatiens* can now be seen on the embankment or on the river-side near it.

I noticed not long since the clearing away of a hedge by the road-side near Worcester, where only a few of the common "jack-by-the-hedge" (*Alliaria officinalis*) usually presented themselves, that the next season the whole line of the hedge where the soil had been upturned, bristled with hundreds of the plant from end to end, forming a brilliant white line when in flower. But this profusion was only of one year's duration.

In like manner it has been a matter of observation dating at least as far back as White of Selborne's time, that when underwood is cut down in coppices, the next season the ground open to the influence of the sun produces a crowd of plants that in the dense shade of the woodland were unable to appear. The local orchid *Epipactis ensifolia* (sword-leaved helleborine), grows in Wyre Forest, scattered about, though rather rarely in most years. But I have noticed, when the underwood, after seven years' growth, has been cut down, that the following year the helleborine springs up in great quantities, adorning the forest glades and rides that have been thus exposed to light and air; but as the underwood grows up again the orchis disappears, not to be found again in any quantity until the next fall of underwood comes round.

I have observed a similar appearance with a commoner plant, the Red Campion (*Lychnis diurna*), which has completely reddened the ground by its numbers in a coppice exposed to the light by the cutting down of its underwood. In this latter case, the seeds, of which a great number are produced by a single plant, have got scattered about the open space, and sprung up accordingly to make the best use of the opportunity. In fact, it is obvious to every-day notice, that any spot of ground where the soil has been turned up and unattended to, is soon covered by an enormous crop of common plants, often of one species only. A corn-field left fallow for a season will soon display a crowded mass of interloping weeds, and here of late years in such places the large blue-flowered *Veronica Buxbaumii* has shown itself in profusion.

It used to be said that Nature abhors a vacuum, and certainly, as regards vegetation, Nature will not allow a vacant spot to remain long without giving it clothing of some sort, though careless whether increased beauty be the result. This is shown in the wildest and bleakest spots. Bromsgrove Lickey, in the north of Worcestershire, consists of hilly ground exposed to northern blasts, and covered with a dense growth of ling (*Calluna vulgaris*), and thick bushes of the Bilberry (*Vaccinium myrtillus*). Wandering here on one occasion, I came upon a spot where, for some purpose or other, a large patch of the ling had been recently cleared away, leaving the soil exposed, and which had got filled up with a tall and crowded growth of *Senecio sylvaticus*, making a strange appearance, surrounded on all sides by old plants of the wiry ling.

Old neglected garden ground that has remained untouched for some years, when re-dug or turned over, will cause flowers to spring up that had remained dormant for an indeterminate time, and it still remains undecided how long seeds may remain in the soil without vegetating. Mr. Flavell Edmonds has recorded a case in the "Transactions of the Woodhope Club," where various plants suddenly appeared on a railway embankment at Hereford, which he contended must have arisen from seeds long immured in the soil. The Rev. J. F. Crouch also mentions in the Transactions of the same club, that in his churchyard at Pembridge, Herefordshire, the *Hyoscyamus niger* had sprung up on soil recently taken from a grave, though the plant had not been before noticed in the neighbourhood. But it must be remembered that seeds get continually blown about, or are deposited by birds, and thus ruined castles and abbeys are in the course of years covered by vegetation; and where plants really appear to arise from buried seeds, it must be open to question as to what probable time the vegetating seeds have remained dormant in the earth.

EDWIN LEES, F.L.S.

Green Hill Summit, Worcester.

SPIDERS' WEBS AND SPINNERETS.

By H. M. J. UNDERHILL.

(*Concluded.*)

SOME of the most remarkable British spiders are the Ciniflonidæ, characterized by possessing a calamistrum and a fourth pair of spinnerets. The calamistrum (*Anglicè* "curling-iron") is a double row of short straight hairs, situated on the last joint but one of the hind legs.

Ciniflo, meaning "hair-curler," is a particularly apt name for this family, as a glance at fig. 137 will show. The "curling-iron" aforesaid is supposed to aid in arranging the curly threads, but I have never been fortunate enough to see the spider use it, nor can I comprehend in what manner its use could effect their curious twistings.

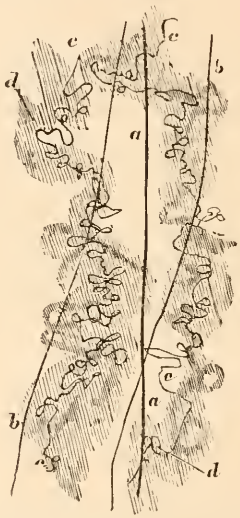


Fig. 137. Single "thread" of web of *Ciniflo atrox*: *a*, first thread; *bb*, second ditto; *cc*, third ditto; *dd*, fourth ditto, × 38.

As spiders, having three pairs of spinnerets, form three kinds of threads, so the Ciniflonidæ, having four pairs, spin four kinds of threads, the extra thread being spun by the extra spinnerets. It is not strictly "a thread," but apparently a collection of threads, doubtless corresponding in number to the holes on the spinneret, and forming a film or membrane of extreme delicacy, enveloping the third or twisted threads (*d*, fig. 137). It is of a blue colour when first spun, but it turns whitish after a time. Ciniflos live in holes in walls, under the bark of trees, &c., and by the blueness of their threads you may know if they are "at home." If so, they are easily caught by using a fly as a bait. Examination of a Ciniflo's web with the unassisted eye shows that its constituent threads are thicker than usual, having a loose or woolly appearance. The microscope reveals that this is due to the threads of the second, third, and fourth kinds, accompanying the first or main thread along its whole course. The second, third, and fourth threads have this further peculiarity—they are doubled; that is, the three pairs of spinnerets which produce them, spin—not one thread per pair, as is usually the case—but one thread each; thus making in all six threads. Fig. 137 is thus a representation of what, apart from the microscope, would be thought a single and somewhat woolly thread.

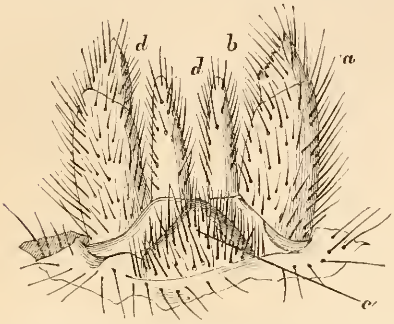
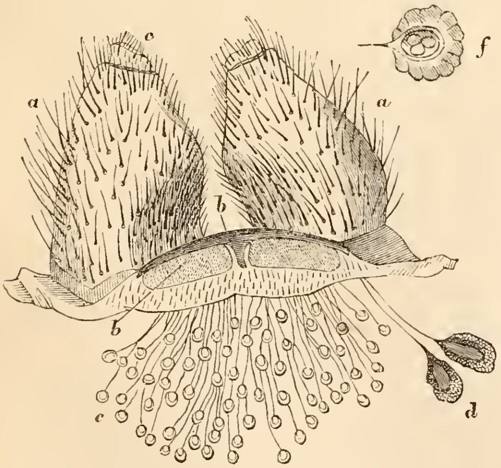


Fig. 138. Upper set of spinnerets of *C. atrox*: *a*, first spinners; *b*, second ditto; *c*, vent; *dd*, silk-tubes, × 38.

The seven constituent threads of each compound "thread" of the web are spun all at once, not by going over the same ground several times; the spider having, however, the power of emitting the first and second threads each one by itself, but the third and fourth threads seem never to be spun separately. For convenience, I have called the



g. 139. Under set of spinnerets of *C. atrox*: *a*, third spinners; *b*, fourth ditto; *c*, silk-tubes; *d*, two of the third glands; *ee*, the fourth glands; *f*, single fourth gland, × 120 diameters.

"film," or collections of threads emitted by the fourth spinnerets, simply "the fourth threads." The web of a Ciniflo is no respect viscid, but, owing to the peculiar character of the third, and the great number and exceeding fineness of the fourth threads, it is even more effectual than the viscid threads of an Epëira in retaining the insects it may entrap.

The fourth spinnerets of a Ciniflo (see *b*, fig. 139) are very peculiar. They are not papillæ covered with projecting silk-tubes, but flat oblong plates pierced with many holes, of which, as nearly as I can calculate, there are 1,250 on each spinneret. In fig. 139, *b*, a general view of the pair is given, and fig. 140 shows a small portion of one, more highly magnified. The glands proper to these are nearly round. In their interior may be distinguished some traces of cellular structure (fig. 139, *f*). The walls of the surrounding epithelium-cells are very slight, and consequently these cells are very easily detached from the glands,

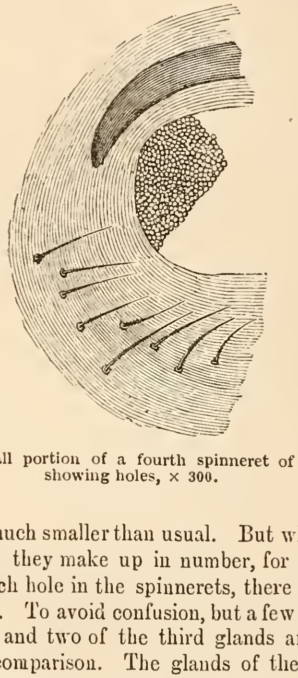


Fig. 140. Small portion of a fourth spinneret of *C. atrox*, showing holes, × 300.

which are much smaller than usual. But what they want in size they make up in number, for as there is one to each hole in the spinnerets, there must be about 2,500. To avoid confusion, but a few of them are figured, and two of the third glands are introduced for comparison. The glands of the second spinnerets are many times longer than those of the first, though the structure is otherwise identical.

There are about 112 silk-tubes on the six ordinary spinnerets of *Ciniflo atrox*, which with, say 2,500 on the fourth or extraordinary pair, make a total of 2,612, a very large number in comparison with the 360 of a house-spider.

In another contribution I hope to give the results of further observations, and to add a few hints which may aid other inquirers in the preparation and mounting of illustrative specimens.

Oxford. H. M. J. UNDERHILL.

"WHEN we talk of the lower animals possessing instinct and not reason, we mean, that although they are sensitive and conscious, yet they act mechanically, and their different states of consciousness are the consequences of their mechanical arrangements."—*Huxley on Automata.*

THE UTILITY OF THE STUDY OF NATURAL HISTORY.

"WHAT is the *use* of studying Natural History?" How often, sadly often, when the votaries of nature are endeavouring to unfold her beauties to the outside world, is this question pressed upon them, and how often does it act, to use a familiar expression, as a "home-thrust." Sceptical schoolboys and quizzical young persons in muslin seem to take an especial pleasure in thus upsetting the equanimity of the naturalist, who is endeavouring to win them over to his side. Now it behoves every rational being to be able to give a reason for his profession and pursuits, least of all ought the students of nature ever to be found at a loss; and in point of fact they very rarely are so. All will readily prove their pursuit to be at once a beautiful and an interesting one, but as for the "use" of it—why, that is a very different matter, and they stand speechless. Of course in this utilitarian age outsiders immediately leap to the very legitimate conclusion that something is rotten in the study of nature. I trust then that I shall be doing service to this branch of science, in attempting to put down as concisely as possible, at least a few of the points in which our favourite pursuits are undoubtedly useful; perhaps I may thereby make it a little easier for my brother naturalists to give a clear answer to any future questions on the score of utility. In the first place, by investigating natural phenomena, we increase the general stock of knowledge, and by increasing this we elevate the human race. It may be that discoveries respecting some bird, beast, or insect do not immediately benefit the world at large, but they certainly aid in determining the laws which prevail in the natural kingdom,—laws which, when rightly understood, will make clear as the noonday those dark enigmas that at present cause such anxiety alike to the theologian and the scientist. No doubt many naturalists are too apt to make a heterogeneous collection of facts, without at all seeking to establish their connection with the system of nature; but in these days of theories we are fast learning to look more closely into the mysteries of cause and effect, while we consider each established principle as an isolated link in a chain that has yet to be constructed. So then, in trying to "get at the truth of God's universe," we are undoubtedly helping on a work beneficial to the rest of mankind. But it may be asked—what good does this do us individually? Much, every way; for natural history educates body and mind. First, as to corporeal benefits, which of course vary according as birds, plants, insects, crustacea, fossils, &c., are made the subject of special investigation. Ornithologists and oologists are in a short time first-rate climbers, and climbing is an exercise that brings every muscle of the body into full play, and accustoms the brain to preserve its usual steadiness at great elevations. Then, with regard to botany, plant-collectors almost always become excellent pedestrians, and in fact, good walking powers are a *sine quâ non* to a botanist who desires to work up the flora of a neighbourhood. It is also necessary that he should be able to get through rough work, as the exigences of the moment may require; now climbing a wall to procure a lichen, now dangling over a precipice to get at a fern; at one time toiling up a hill-side in the search for gentians, at another wading through a quagmire looking for reeds. As for the insect-hunter, whether he be lepidopterist, coleopterist, or any other specialist, his powers of walking, running, and general endurance are continually put to the test. He has often to walk many miles to his district, and when arrived there, to run many more in pursuit of his insects if they be winged; if apterous, to search most laboriously over every square yard of ground. If moths are his *desiderata*, he must often rise at daybreak, or remain in the woods till the small hours of the morning. This Spartan discipline is not, and cannot be, without its good effects on the *physique* of the collector. The naturalist who devotes himself to the crustacea or mollusca has, like his brethren, no easy task. His search must be conducted in sea-water, in fresh water, and on dry land. The objects of his attention are more than usually varied in form, size, habit, and habitat, and in consequence, his excursions are more than usually erratic. Lastly, what is to be said of the geologist? His practical work consists, for the most part, in digging out fossils from the clay, chalk, and limestone formations, and fossiliferous rocks. To do this well, he needs a sharp eye and a steady hand, not to mention a great deal of patience—a virtue which he shares in common with all other naturalists. Thus much for bodily benefits. The education of the mind is a still broader subject, on which I cannot even attempt to particularize. There can be no doubt that the study of Natural History induces a scientific habit of mind—that is to say, a habit of carefully reasoning out, and correctly deducing conclusions from given data; a habit of looking at debated matters from all points of view; a habit of throwing aside all prejudice and littleness of mind; of considering everything honestly, fairly, and temperately. It is needless to point out how increasingly important science is becoming as a matter of education; how many scholarships are yearly awarded at the universities for proficiency in its different branches; or, how difficult it is to keep pace with the spirit of the age without some knowledge of the conditions under which the universe exists. Enough has been said to show that the pursuit of Natural History is full of usefulness, if only we take care to keep the *end* constantly in view, never placing an undue estimate on the *means*, but continually searching out and examining "whatsoever things are true."

EDWARD C. LEFROY.

HOW TO FIX DEVICES OF DIATOMS.

SOME of your correspondents have made inquiries how to *fix* devices of diatoms. There is some secret about doing it which the best diatomists hold very fast. After many hundreds of failures, I have "wriggled" my way to the outskirts (only the outskirts) of the secret; and what I know I shall be glad to tell. We must presume that the diatoms are perfectly clean, that a "dip" of the material containing them has been evaporated on a slip, and that the hair from a cow's neck (which is the best tool) has been duly mounted in a wooden handle. When a diatom is picked up by the hair from the dip, under a 1½-inch power (and after practice they may be picked up at eight or ten per minute), the question is where to put it. Some say, "into a minute drop of water." This is easiest, but no one can *arrange* diatoms in such a drop. I put them on a prepared (glazed) cover. I take distilled water and filtered gum (either arabic or tragacanth, but I prefer the latter), both being chemically and microscopically clean (if I can get them clean: I never have as yet), and into a 2-ounce phial put, say one ounce of the water and five or six drops of the gum. I then clean covers (I glaze 50 or 100 at a sitting), and place them on a rack of wood, *i.e.* six pieces, 6 inches long, ¼ inch broad, and ⅓ inch thick, formed into a "rack" by having pieces of copper wire run through the lot near to each end, so that the bars of the rack, slid on the wires, may be altered to suit different sizes of covers. I then take a dip of the gum-water in a very-fine mouthed pipette (never putting the pipette more than halfway into the water, and throwing away the first four dips for fear of dirt), and, having the rack full of covers, allow a minute drop to escape on the centre of each cover, holding the cover with a clean needle to prevent its being *lifted* when I withdraw the pipette. I then transfer the loaded rack to the hot plate. Here the usefulness of the rack will be felt, as it reduces to a minimum the exposure of the covers to the vile inappreciable dust. And, by the way, to glaze covers or mount diatoms on any but the calmest of days is absolutely impossible. The glazed covers, when dry, I store under a well-closed glass shade. One of these covers I place on a wooden slide (they slip on glass) perforated with a ⅝-inch hole (or three such slides may be used at once, or one slide with three holes, so as to select three species from the same dip), and have it at a handy distance (three or four inches) from the stage. On this cover I put the diatoms, picked out with the cow's hair aforesaid. If the diatoms be plentiful, I simply "dab" the hair gently three or four times on the cover to disengage the frustule: by this mode half the diatoms are lost and half the time is saved. But if the valve be a gem (*A. Kittonii* to wit), I hold it within the field of the microscope with my right hand (hand-rests are supposed) whilst, with my left, I remove the dip and replace it with the wooden slide, disengaging the valve very carefully in the centre of the glazed dot. When sufficient frustules have been placed on a cover to form a device (cross, star, initials, &c.), I place, push, coax, or drive them, with the hair, under a 1½-inch objective, into the required form. In this operation, delicacy of touch, coolness, and patience are somewhat helpful; moreover, to steady the operating hand with the other is an advantage. This done, the cover with its device must be brought close to (just within) the mouth, and breathed on—one long slow breath. Diatoms will not bear coughing at. But if all this has been done successfully, difficulty is at an end. The cover must be dried on the hot plate and then turned over on to a drop of balsam and benzole, or damar, in the centre of a slide; and, if the glaze be the proper thickness, the balsam may be boiled to one's heart's content without moving a single valve, and the slide finished there and then. As I said at the outset, there is a secret beyond all this (I wish some one would publish it), but I have proved that by this process the fixing of any number of diatoms in any device is only a question of time, patience, and manipulatory skill. In closing, let me say three things to those who aspire to be "diatomaniacs":—1. Never hope for one drop of clean water, unless you distil it yourself, and don't be sanguine then; 2. Place your diatoms "on their backs" in the gum, else they will retain air, which nothing can expel; 3. "Mind your eye," or rather your eyes, for mine have been so strained with arranging diatoms that I have not dared to *work* with the instrument for several months.

J. K. JACKSON.

NOTES ON THE LEPIDOPTERA OF GUERNSEY.

IN vol. viii. p. 65, of SCIENCE-GOSSIP, Mr. W. H. Booth has given us the result of his observations on the butterflies of the Channel Islands; but his experience appears to have been mostly confined to Jersey; and as any reliable information which can be collected respecting the entomology of different parts of the kingdom must greatly assist us in forming an accurate idea of the distribution of species, I will, with your permission, add a few notes on the lepidoptera of Guernsey from observations which I have made during a residence of several years in that island.

Of butterflies the number of species barely exceeds thirty, and even among these we might reckon a few, such as the tailed Blue (*P. Bæticus*), which have been taken so sparingly, and at such wide intervals, that they are fairly entitled to rank among the "reputed species." *C. Edusa* is frequently seen flitting along the bold, rugged cliff-sides of the south coast, and *C. Hyale* is not rare. *G. Rhamni* is found, as here, from early spring to late autumn, and white specimens are occasionally met with. *H. Semele* is very common on the cliffs, especially where grey moss-covered stones occur, and on these it loves to settle in the warm sun. Its peculiar habit of concealing

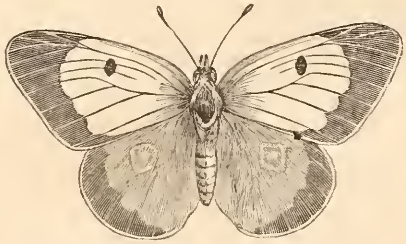


Fig. 141. Clouded Yellow (*Colias Edusa*), Male.

the anterior wings, combined with the striking resemblance of the under side of the hind wings to the grey stone, renders it exceedingly difficult to detect, even at a short distance, and I have often been puzzled to know where half a dozen of these butterflies had got to, though I well knew they were within twenty feet of my very eyes. *C. Cardui* is generally distributed throughout the island, in some years abundant, while at other times only a

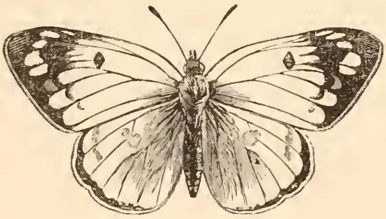


Fig. 142. Pale Clouded Yellow (*Colias Hyale*).

few straggling specimens are to be seen. *V. Atalanta* is the most common of the family, and is known as the "King's Butterfly." *V. Urticæ* is less frequent, and *V. Io* I have rarely seen on the wing, though I have reared the caterpillars. *V. Polychloros* is, I believe, scarce; at least, I only saw one living specimen, a hybernated one, which I captured. The Glanville Fritillary (*M. Cinxia*) is extremely abundant in the south. I have seen scores of them in a day's ramble in June; a sight which I fancy would delight many an inland collector's heart. I have frequently reared them from the caterpillars, which are gregarious, and feed on the narrow-leaved plantain, under cover of a whitish web. The Rev. J. F. Dawson, in the *Zoologist*, 1846, p. 1271 (quoted by Stainton), gives an admirable description of the favourite haunts of this species. *F. Rubi* frequents the banks of streams, where it is common in May; it appears to be single-brooded.

Fig. 143. Green Hairstreak (upper side).

Fig. 144. Green Hairstreak (under side).

The little island of Sark—the gem of the Channel Islands—possesses but a meagre list of lepidoptera, though some species occur in more or less abundance which in the larger island are exceedingly rare; for, as it has been remarked, "each of the Channel

Fig. 145. Glanville Fritillary (*Melitæa Cinxia*), (upper side of variety).

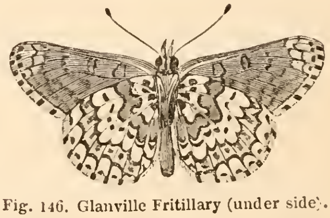


Fig. 146. Glanville Fritillary (under side).

Fig. 147. Cinnabar (*Euchelia Jacobææ*).

Islands possesses a fauna and flora of its own." Two species of butterflies, *C. Aglaia* and *C. Pamphilus*, I have never met with in Guernsey, while in Sark they are common; and many a sharp spin have I had through furze and fern after the former. I may mention, parenthetically, that the Rose-chafer (*Cetonia aurata*) occurs in such profusion that I once counted, in rather less than five minutes, thirteen specimens on bramble-blossoms and other flowers; yet a true Guernsey specimen is, I believe, a great rarity.

Fig. 148.—The Drinker (*Odonestis potatoria*).

"British Moths." *E. Jacobææ* is abundant, at times almost a pest; the gregarious larvæ strip the rag-wort plants till only the bare stalks are left. *Lasiocampa Quercûs* and *L. Rubi* are very common, more especially the former. The larvæ of the latter, which are very pretty, seem more confined to the coast. I have handled many scores of larvæ and cocoons of both these species without ever experiencing the urticating effects of the hairs mentioned by some of your correspondents; the only peculiarity which I noticed was a kind of *velvety* (I can't find a better word) feeling about the finger-tips, produced by a quantity of minute hairs sticking into the skin; and this *velvetiness* was only removed after repeated washing and rubbing. There was no irritation or pain. This also applies to *O.*

Fig. 149. The Convolvulus Hawk-moth (*Sphinx Convolvuli*).

potatoria, and other hairy larvæ. The Sphingidæ are not numerous in species. *A. Atropos*, in its earlier stages, is well known to the farm-labourers and cottagers, who cultivate large quantities of potatoes for the English market. One larva which I reared produced a moth of uncommon size and beauty. I have a specimen of *S. Convolvuli* which was taken in a greenhouse. *D. Euphorbiæ* may at one time have been taken in the island, for a gentleman, some 30 years ago, found a brood of larvæ, from which he succeeded in rearing several splendid moths, which are now in his collection.

More might be said about the moths of Guernsey; but I have neither my collections nor the diaries which I kept during my stay there (now some years ago) by me, and I dare not trust to memory.

Finchley. E. D. M.

Among moths perhaps the most worthy of the notice of an English collector is the Guernsey Tiger (*Callimorpha Hera*), a rather common and generally distributed species of surpassing beauty, especially

Fig. 150. The Spurge Hawk-moth (*Deilephila Euphorbiæ*).

when fresh from the chrysalis. The Rev. F. O. Morris, who many years ago obtained a large number of larvæ from a gentleman in Guernsey, has given an admirable figure of this insect in his

THE SPIDER AND THE LIZARD.

I WAS, one day lately, walking in the fields when, being weary, I laid myself on the grass in such a position that, my head just surmounting the crest of a hillock, I could watch with ease all that passed on the other side without exposing myself to view. I was thus enabled to look across the grass, and my eyes wandered over the tortuous labyrinth and the tufts of herbage. I saw the ants pass and repass in the forest of flowery turf. I saw numerous Pentatomes, variegated like so many harlequins, pursuing the Chyrsomeles, more brilliant than jewels. I followed with my eyes the Brachinus and Harpalus seeking the protection of the flints that strewed the ground; and I heard the crickets as they sat, each at his threshold, singing their songs to the sun.

When I compared myself with all this tiny world, I was positively frightened at my colossal proportions and the vastness of my limbs. It seemed to me as though my head had the dimensions of a house; my eyes were two great windows; and my body, as it lay extended over the turf, seemed to cover a country, which could be measured only by leagues!

I was occupied with these fantatic thoughts, when my eyes were suddenly arrested by the appearance of a large spider, which issued like a spectre from the bosom of the earth. At first I saw a kind of lid, about the size of a small halfpenny, slowly raise itself above the surface of the soil; then some long hairy legs stretched themselves out from a tube which the lid had previously covered with the utmost exactness. It seemed as though a fearful phantom were lifting the rocky cover of its tomb in order to strike with sudden horror the conscience of some great criminal. However, I felt that I had nothing to reproach myself with in reference to the world of spiders; so far, therefore, from recoiling from the sight before me, I set myself to examine the matter with eager attention.

The apparition was that of a Trap-door Spider (*Mygale cæmentaria*), a species widely spread over the South of France, which exhibits in its name the wonderful instinct by which it is marked. In fact the Mygale excavates for itself in the soil a deep and spacious gallery, the entrance of which it closes by means of a veritable door, which it is impossible to open except by pushing it from the inside. This door, composed of hardened particles of clay held together by silken threads, which the animal itself secretes, is very thick and solid. A silken hinge holds it in place and fixes it to one side of the gallery; on the other side there is neither lock nor bolt, all the ingenuity of the spider not having yet reached to these additional modes of defence, the want of which in this particular instance very nearly cost the inmate her life.

Squatting under the lid, which rested on her back as she lay half out of the tube, the spider eagerly watched every movement of a delicate Lacewing fly, which stalked lazily over the gilded petals of a trefoil. The wings of this lovely insect, so thin and transparent that one might believe them to have been worked by fairy fingers, reflected the glorious hues of Iris herself in the sun's bright ray, and as they glistened in the spider's eight dark eyes, evidently did but rouse more strongly her ferocious desires. Indeed the hairy spinner fairly trembled with excitement and impatience as the graceful fly moved slowly toward the den, dark and cold as the grave, where the spider lay in ambush. In another moment it walked into the very jaws of death, when I heard a slight crackling in the dry herbage, and then with a suddenness which made me start, a bright green lizard dashed from a tuft of grass and bounded toward the spider. Though quite taken by surprise, the latter had just time to avoid the fatal stroke by drawing back with a rapidity at least equal to that of her enemy, and violently closing the lid of her gallery. So near, however was the lizard to seizing his prey, that the toes of the right fore foot were actually caught between the door and the side of the tube, and vain were the reptile's efforts to disengage itself, though it twisted its lithe body from side to side like one possessed.

Had the spider been able to close the gate of the castle with stout bolt and bar, never would our lizard have boasted of another victory over spider or insect: it must have perished miserably of hunger and exhaustion! Meanwhile it strove hard to raise the lid with its muzzle, and failing in this after several attempts, it managed in the course of its struggle to insert the end of its tail into the slight opening made by its foot. Then for the first time I could see the wretched spider doubled up against the wall of its den and holding on with all its might by means of his claws, to the inner face of the silken door, which, however, was gradually yielding to the efforts of the enemy. I thought it right, therefore, to put a stop without delay to the unequal combat. No sooner thought, than done. From the summit of the hillock, on which my chin was resting, I emitted a loud brrrrrr! In a second, as once with the great god, Jove—

"Olympus trembled at my nod!"

The frightened lizard, in the energy of despair, tore its foot from the trap, with the loss of two or three toes, and bounding into the grass disappeared from view. Mygale as instantly closed her gate without offering me a single expression of gratitude for the good turn I had done her; while I, starting to my feet, continued my walk, pondering on the curious scene of which I had been a witness.

A. ROGER.

MICROSCOPY.

A Finder for Hartnack's Microscopes.—Those of our readers who use Hartnack's, or microscopes of similar construction, will find Mr. Hicks's contrivance for the purpose of easily refinding an object at any time very useful. A line is to be ruled across the centre of the stage from side to side. Crossing this line at right angles are ruled two lines about two inches apart, one on either side of the aperture of the stage. In order to use the finder, a label about half an inch in diameter is fixed to each end of the slide, the lines on the stage left uncovered being used as guides for continuing the lines across the label with a pencil-mark. If the lines marked on the label be made to coincide with those on the stage, the object on the slide will be found in the centre of the field. Mr. Hicks says that he finds roughing the ends of the slide with a corundum file, and marking the point of intersection with an ink dot, preferable to the labels, as being more accurate. We think a label somewhat less than an inch square (about nine-tenths of an inch), so as the stage lines might be seen round the margins, would be more advantageous than those of a circular form, as the position of the stage-lines could be marked on the margin of the label, and the position of the object might be registered by marking down the number of dots from the top left-hand corner; supposing it to be the fourth in a vertical and the seventh in a horizontal direction, it could be registered either 4 | 7—or $\frac{4}{7}$.—*K.*

Micrographic Dictionary.—The third edition of this magnificent work has now reached the fourteenth part, and is about halfway through its course. The delay in its publication may be partially attributed to the little leisure left to its editors, as well as to the fact that the newest information relating to microscopical research has been incorporated. The editors are Dr. J. W. Griffiths, Professor Martin Duncan, Professor Rupert Jones, and the Rev. M. J. Berkeley. To the young microscopist this work will prove a *vade-mecum*, and to the microscopical amateur it offers itself as a repertory of microscopical knowledge, easily attainable, and thoroughly trustworthy. The publisher is Van Voorst, 1, Paternoster-row, London.

Organisms in Chert.—The remains of foraminifera, prisms from shells of Inoceremas or Pinna, small mollusca, and fragments of bryozoa, are not uncommon either in chert or flint nodules. All these remains represent the internal rather than the external form of the shell. As it is not very apparent why this should be the case, the following theory will perhaps explain it. All the specimens I have had an opportunity of studying, when examined as opaque objects, are either of a chalky whiteness or coloured with peroxide of iron; in this condition the silicified casts of foraminifera and other organisms are found in recent dredgings. In a highly interesting dredging made by Captain Perry, off Navy Bay, Colon, Panama, silicified casts of foraminifera, small mollusca, borings of some species of cliona, fragments of bryozoa, and species of echinus, occur in considerable quantities. It therefore seems probable that these remains occurring in the chert and flint nodules were silicified before they became embedded in the flint. The little spiral organism figured in the August number is certainly not that of foraminifera, but some small mollusk, the two lower figures representing transverse sections of the same or a similar form.—*F. K.*

Chloride of Barium as a Preservative.—This salt, which we recommend for use in glycerine jelly, and which may prove a useful preservative for other mounting media, &c., is seldom kept by druggists, and has to be procured from the scientific chemist. It is sold (price 2d. per oz., or by post 3½d.) by Townson & Mercer, 89, Bishopsgate-street Within.—*H. M. J. U. and F. J. A.*

Origin of the Red Blood-Corpuscles.—As to the origin of these corpuscles in vertebrates, the fact, as stated in Science-Gossip, August, 1874, page 183, has long been so well known in England that no further corroboration of it was needed from abroad. Yet we see it widely published, as if Dr. H. D. Schmidt, from the result of his own investigations, has very recently discovered that "the nucleus only of the colourless blood-corpuscles is developed into the red corpuscle," which his pages might otherwise countenance. The truth is that neither Dr. H. D. Schmidt, nor any German, has or ever had any just claim whatever to this important discovery. It is due wholly to the researches of our countryman, Mr. Wharton Jones, whose original memoir on the subject, entitled "The Blood-corpuscle considered in its different Phases of Development in the Animal Series," was published in the "Abstracts of Papers communicated to the Royal Society of London," June 19, 1845; and at length, with illustrations by beautiful plates, in the next succeeding part of the "Philosophical Transactions." Scarcely any physiological contribution is better known than this in Britain; for example, in Professor Gulliver's lectures on the blood, delivered at the Royal College of Surgeons, Mr. Jones's doctrine is discussed and accepted, as may be seen by the reports of those lectures in the *Medical Times and Gazette* for 1862, August 23, p. 188, and December 13, p. 623. That "the spleen and lymphatic glands are the permanent blood-formative organs," at least of the corpuscles of that fluid, was the doctrine admirably supported by William Hewson upwards of a century since, as may be conveniently seen in the collected edition of his Works, printed for the Sydenham Society, 1845. The present note is no matter of controversy, but simply specific references, by which any person may realize an historical truth affecting the just claim of an eminent English physiologist.—*Q. F.*

ZOOLOGY.

New Order of Hydrozoa.—Professor Allman describes in *Nature*, July 30th, a new order of hydrozoa discovered on the southern shores of France. This animal is attached to a sponge, and permeates the spongy tissue. Although a hydrozoan, it is not a hydroid, and cannot be referred to any of the existing orders of the hydrozoa. The chitonous tubes which permeate the sponge tissue are united towards the base of the sponge, and constitute a composite colony of zooids. The tubes are increased in width towards their free extremity, and the polypite inhabiting each puts forth a retractile crown of tentacles. In many respects this new hydrozoan resembles the Campanularian zoophytes. The name of *Stephanocyphus mirabilis* has been given by the Professor to this beautiful object. In no instance was this zoophyte unaccompanied by the sponge. The new order to which it belongs has been named *Thecomedusæ*.

Generic Names.—We have some excellent scientific journals in this country, but none that covers exactly the same ground that Science-Gossip does. Let me, however, suggest one thing to a number of your contributors in reference to scientific nomenclature. It is presuming too much to suppose that their readers in other countries should know the genus of the animals or plants they allude to by merely inserting the initials of the generic names. Of course, it is not necessary to repeat them when once given in an article, except in cases where other generic names in the context intervene. "Notes on the Entomological Season of 1873," in the January number, 1874, is an illustration of this delinquency. Specialists, well versed in scientific literature of their specialties, may be able to comprehend what name is meant by an initial alone, but this is not the case with amateurs, nor yet with those who take a general view of the subject.—*S. S. Rathvon, Lan. Pa., U.S.*

The Processionary Moth.—It will interest many to know that this moth, concerning which queries have been more than once propounded in Science-Gossip, has unexpectedly turned up in Britain. There are, however, two species nearly allied, to which the name of the "Processionary" has been applied, the particular one recently taken being that designated *C. pityocampa*, and considered to be identical with the insect which the Romans were acquainted with, and which received from them the name of "the moth of the fir." On account of the deleterious effects produced by the hairs of the caterpillars, it was regarded as a crime to administer *pityocampa*. The first discovery was made last autumn, when Mr. Batchelor detected in a pine-tree wood near Southborough, a mass of pupæ in a deserted magpie's nest. These he distributed, believing them to be something rare, probably *C. processionea;* and about the middle of February this year he found a number of silken nests on the tops of pines, or Scotch firs, which were being cut down, and the larvæ, in their mode of procedure, showed all those peculiarities which have been so frequently described by continental observers. Some were also taken by the same entomologist in another spot on the Penshurst-road. Two or three weeks later, another gentleman, Mr. Peyton, discovered colonies feeding on fir-trees at Seal, near Sevenoaks, and the larvæ have been proved to be the same as those taken near Southborough. Both accounts appear to be *bonâ fide*, and specimens have been submitted to, and named by, Mr. Doubleday, but there are some difficulties that yet remain to be cleared up. It is strange that pupæ should be found in autumn and larvæ early in the following spring; and, moreover, it is not the habit of *C. pityocampa* to be gregarious in pupation, each usually going alone to the surface of the earth. I have no doubt these curious discoveries will lead many naturalists to pay more particular attention to the pines and firs, especially in the county of Kent.—*J. R. S. C.*

Length of Spiders' Cords.—It has often been a matter of speculation by what means the ingenious arachnids carry a thread a long distance from one point of suspension to another, and recently I observed one cord, swung to by a spider of moderate dimensions, which exceeded anything I had before noticed in that way, as it extended about eight feet from the top of a door to a shrub, and at an altitude of about seven feet from the ground. One can hardly suppose it possible that a thread could be projected through the air for that distance so as to attach itself; nor does the idea that the spider first secured one end and then travelled to the opposite point with his ball of cord to fasten the other, and tighten it, like a man fixing a telegraph-wire, appear much more feasible.—*J. R. S. C.*

Ichneumon of the Aphis.—Although I have no special knowledge of *Hymenoptera*, I cannot help observing an incorrect statement at page 180 of Science-Gossip for July, which you may like to correct. The "Ichneumon of the Aphis" there drawn is not in the least like *Ophion luteum*, to which species it is ascribed. *Ophion luteum* is one of our largest species, and parasitic upon the great larva of the Puss-moth (*Dicranura vinula*), so that, apart from the certainty afforded by the figure, it is obvious that no instinct could compel so "canny" a creature as an *Ichneumon* (whose whole functions are anticipatory for the good of its progeny, not itself) to deposit an egg in so unsuitable a pabulum as an *Aphis*. The *Ichneumon* figured is one of the very minute species, probably an *Aphidius*, a genus well known to be parasitic on *Aphides* (hence its name, indeed). *Ophion luteum*, instead of being " about a line " long, as stated, is nearer *eight* lines : it is the common testaceous-red species that often flies to light. Its abdomen is sickle-shaped with terebra. Your paper is now getting of so much higher a standard than before, that such an error, unnoticed, is really likely to hurt it.—*E. C. Rye*.

Provincial Societies.—We notice with pleasure the " Journal of Proceedings " of the Winchester and Hampshire Literary and Scientific Society. It is a well printed, fairly illustrated, and thoroughly creditable *brochure*, containing, besides several literary papers of merit, scientific essays and addresses by the Rev. E. Firmetore, F.R.A.S., on the " Star Depths ;" " the Probable Origin of Flints," by Mr. A. Angell, in which this difficult question is very ably handled; "Parasitic Fungi common in the Neighbourhood," by the Honorary Secretary, Mr. F. J. Warner, F.L.S., a short but valuable contribution to this important subject ; and "Hampshire Insects," by the Rev, W. W. Spicer. The new series of the "Proceedings of the Bristol Naturalists' Society " has slso been published. The paper on Dundry Gasteropods," by E. B. Tawney, F.G.S., is excellently illustrated with lithographs of the best fossil shells, so that it is a capital contribution to local geology. Mr. W. W. Stoddart's paper on " The Desmidiæ of the Bristol Neighbourhood " will also be appreciated by algologists. The present part is certainly the best this Society has yet issued, and we sincerely compliment them on its production, with a word of advice to give preference to papers on *local* rather than on foreign natural history.

The Canterbury Tick.—As this interesting animal is likely to be largely sought for throughout England by entomologists, perhaps the following extract respecting the species at present known may be of interest. I take the account from Baron Walchenaer's "Histoire Nat. des Insectes Aptères," iii. 229, &c., forming part of the beautiful series known as the "Suites à Buffon." Paris: 1844. "Argas (Latreille, 'Précis des Caract. gén. des Ins.,' ix. 178).—These animals, whose external characters have been studied by M. Savigny with great care, are truly parasitic. Two of them live on birds; another, which has become famous under the name of *Argas persicus*, often inflicts terrible pains on man. This species—respecting which M. Fischer de Waldheim has published a monograph with the title of 'The Persian Argas, the Mallch of Mianeh,' described under the name of the Venomous Bug of Mianeh (4° Acad. of Moscow, 1823), has given occasion to much exaggeration on the part of travellers. The body is oval, elongate, more contracted before than in the bed-bug, to which it may be compared. The upper surface is garnished with small whitish grains, giving it the appearance of shagreened leather. A border runs round the sides, which are slightly divided at the apex. The colour is a bright blood-red; the back being sprinkled with elevated white points; the feet are pale (fig. Atlas, 33, 6). Other species are *Argas reflexus*, Latr.; *Ixodes marginatus*, F.; *Rhynchoprion columbæ*, Hermann ; *A. troguloides*, Gervais; *A. Savignyi*, Aud. (fig. Atlas, 31); *A. Fischeri*, Aud. (Atlas, 33, 5); *A. Hermanni*, Aud.; *A. mauritianus*, Guerin; *A. chinche*, Goudot; and *A. erraticus*, Lucas; the last an Algerian species. *A. reflexus* lives parasitically on pigeons, whose blood it sucks. Extraordinary numbers are sometimes seen on these birds, especially on the young. When swollen with blood, the body is soft and the divisions of the abdomen are no longer distinct. Hermann kept one alive for eight months in a glass without any food; during which time nothing passed from it, nor did he perceive the slightest diminution in its size or any symptom of decay. Latreille states that he has found this animal wandering about houses. The body, which is large, is marked all over with tortuous channels and pits; the colour is yellow, or violet when full fed. *Argas troguloides* is about the size of the itch-insect (*Sarcoptes*). It is of a yellowish colour, and was found by us in a garden at Paris, on the surface of the soil, in spots shaded by the leaves of plants. *Argas mauritianus* supports itself on fowls in the island from which it derives its specific name, and often occasions great losses in the poultry-yards. *Argas chinche* lives in the temperate parts of Columbia. Its habits are similar to those of *A. persicus*, and, like it, it persecutes mankind. In size it resembles the common bedbug; but is of a totally different colour when full fed."—*W. W. S.*

A New British Crustacean.—In the *Annals and Magazine of Natural History* for July, the Rev. T. R. Stebbing describes a new species of amphipodous crustacea, under the name of *Liljeborgia Normanni*. The specimen was taken under a stone in Salcombe Harbour. Its colour was orange, mottled with rose-red, and its length, exclusive of the antennæ, was three-tenths of an inch. Subsequently a female specimen was obtained, whose adult state was indicated by its having a pouch containing eggs.

BOTANY.

British Hepaticæ.—We have received the second part of this splendid work by Dr. Carrington, and are glad to note it is worthy its first promise. There are four coloured plates to each number of one edition, beautifully got up, and so delicately tinted that the usual complaint of over colouring cannot possibly be made in this case. The work is intended to give descriptions and figures of the native species of *Jungermannia*, *Marchantia*, and *Anthoceros*, together with all their known habitats. As it comes out in monthly parts, coloured and uncoloured, it gives English students the opportunity of adding an artistic and valuable book to their library.

Scirpus lacustris and triqueter.—If "T.W." could see these two plants together, he would have no difficulty in distinguishing them. (See Science-Gossip for last June.) I have constantly seen the *Scirpus lacustris* in Switzerland; it is five or six feet, or even more, in water; but I have never seen the *Scirpus triqueter* (which is very abundant in shallow water in the marsh at Villeneuve, at the head of the Lake of Geneva) more than eighteen or twenty inches high. The stem of *S. lacustris* is certainly round, that of *S. triqueter* as certainly acutely three-edged, as stated in my edition (1848) of Withing, and not with blunt edges. *Scirpus carinatus* is obtusely three-edged above the middle, and may perhaps be the one referred to as quoted from Roth. Some of the species of *Scirpus* bear so strong a resemblance to each other that they can only be determined by the form of the minute seeds; for instance, the *Scirpus triqueter* and *Scirpus mucronatus*, both growing together in the marsh at Villeneuve, have so much the same appearance externally as to be undistinguishable except by the seeds. Dr. Muret, ex-judge of Lausanne, an ardent and indefatigable botanist, although often frequenting the marsh, had always taken them for one and the same species, viz. *S. triqueter*, till I drew his attention to the seeds, those of *S. triqueter* being smooth, and those of *S. mucronatus* being transversely wrinkled; and M. Rapin, author of the "Flora of Canton Vaud," at first took both for the same plant, till I referred him to his own "Flora," when he afterwards told me he was satisfied they were distinct; and though the *S. triqueter* is stated to have *fibrous* roots and *S. mucronatus* running ones, the characters are sometimes so indistinct as to lead one to suppose they may have hybridized, growing as they do close together. There is a *Scirpus*, considered by some as a variety of *S. lacustris*, viz. *S. tabernæ montani*, Gmell. (*S. glaucus*, Smith, Eng. Bot.), a smaller and weaker plant with two stigmas, the *S. lacustris* having three. Rapin says it is found in places inundated during the winter; Hooker says it has a glaucous colour, and that he "admits it as a species with hesitation, the distinction only resting on artificial or microscopical characters." Rapin says the seed is *plan-convexe*, while that of the *S. lacustris*, he says, is *trigone*. As the name of *carinatus* is sometimes, according to Bentham, given to a variety of *S. triqueter* and sometimes to a variety of *S. lacustris*, may not the *S. carinatus* be a hybrid between the two? Gaudin ("Flora Helvetica") says it is "culmo *obsolete* trigono, hinc *planiusculo*, species triquetro et lacustri, illi majus habitu, huic potissimum fructificatione affinis."—*T. B. W.*, *Brighton.*

The Pitcher-plant and its Prey.—Dr. Mellichamp, of Bluffton, South Carolina, has been prosecuting researches on the pitchers of *Sarracenia variolaris* and the way in which insects are caught in them. The species abounds in this district, and even early in May many pitchers were developed. He has confirmed the presence of the sugary secretion within the rim. He finds that it bedews the throat all the way round the rim, and extends downwards from ¼ inch to ¾ inch. Dr. Mellichamp also finds—and this is his most curious discovery—that this sweet secretion is continued externally in a line along the edge of the wing of the pitchers down to the petiole or to the ground, forming a honeyed trail or pathway up which some insects, and especially ants, travel to the more copious feeding-ground above; whence they are precipitated into the well beneath. Ants are largely accumulated in these pitchers. As to the supposed intoxicating qualities of this secretion, Dr. Mellichamp was unable to find any evidence of it. On cutting off the summit of the pitchers and exposing them freely to flies in his house, he found that the insects which came to them, and fed upon the sweet matter with avidity, flew away after sipping their fill, to all appearance unharmed. On the other hand, he thinks that the watery liquid in which the insects are drowned and macerated possesses anæsthetic properties; that house-flies, after brief immersion in it, and when permitted to walk about in a thin layer of it, "were invariably killed—as at first supposed—or at any rate stupefied or paralyzed, in from half a minute to three or five minutes," but most of them would revive very gradually in the course of an hour or so.

The Potato Disease in Kent.—Watching in North Kent the rise, progress, and consummation of this foe to the farmer during the past autumn, I am convinced that fields lying low, and badly drained, are most apt to be affected, other things being equal. The infatuation with which many men are possessed, leads them to neglect precautions they might take, which would rescue part of the crop, especially a speedy digging and careful separation of the diseased, with the immediate combustion of the infected leaves, which have, as I have noticed, a perceptible influence on other plants near, by infecting the atmosphere. In not a few fields where the potatoes were attacked, weeding had not been properly attended to, through the men being taken up with harvesting, and the rows were overrun with straggling plants, the couch-grass being prominent. All this was much against Paddy's favourite vegetable.—*J. R. S. C.*

The Scented Violet (*V. odorata*).—It has been reported for some years past by botanists in the South of England that this favourite flower has been growing more scarce. I am glad to be able to report that in some districts of North Kent, near Gravesend and Cobham, it grows plentifully, being indeed sufficiently abundant to betray itself by the perfume diffused through the air while it is in flower. Brought on by the mild weather, the violet was out early this spring, and by April 1st scarcely one was to be found. On chalk and limestone in Kent, this plant seems to give the preference to shady lanes, with high hedge-banks, being more usual in such spots than in woods.—*J. R. S. C.*

Water Avens.—I have gathered *Geum rivale* in woods in this parish; generally, if not always, near running water.—*H. M. C. Allen, Barcombe Rectory, Sussex.*

The Flora of Colorado.—Messrs. Thomas C. Porter and John M. Coulter have just issued their "Synopsis of the Flora of Colorado." It is an exhaustive catalogue of the phænogamous and cryptogamous plants of this interesting country, and contains concise but definite descriptions of the new and rarer species. The work is exceedingly well done, and we agree with the authors in their preface in regretting that an introductory article on the geographical distribution of the plants embraced in the "Synopsis" could not be included in it. The geographical distribution of the Colorado plants cannot fail to be of interest to botanists and geologists.

Verbascum Lychnitis.—I hasten to inform your botanical readers that at the present time a number of plants of the somewhat rare *Verbascum lychnitis* are in blossom on the down side of the London, Chatham, and Dover Railway just beyond Bickley Station.—*G. S. Boulger, July* 24.

The London Catalogue of British Plants.—The seventh edition of this indispensable work has just been issued. It is published under the direction of the London Botanical Exchange Club, and is admirably adapted for marking desiderata in exchange of specimens; for an Index Catalogue to British herbaria, indicating the species of local districts, as well as for a guide to collectors, by showing the comparative frequency or rarity of the various species. The price (sixpence) brings it within the reach of the poorest botanical student. It is published by Hardwicke, 192, Piccadilly.

British Marine Algæ.—This cheap, well written, and excellently illustrated work has reached the seventh part. We cannot recommend a better manual to young students; and the fact that its author is W. H. Grattann is a good guarantee for its accuracy and fulness.

GEOLOGY.

The Quaternary Period in the Isle of Portland and around Weymouth.—A paper on this subject was read by Joseph Prestwich, Esq., F.R.S., F.G.S. The author remarked that although the physical features connected with the later geological changes in the district were of much interest, they had hitherto attracted little attention. Commencing with the oldest drift-beds, he showed that the remains of one, formerly more extensive, had been found in the Isle of Porland at a height of 400 feet above the sea; that it contained the remains of the *Elephas antiquus, Equus fossilis*, &c.; and that he found in this bed a number of pebbles of sandstone and ironstone of Tertiary age, and of chert from the Greensands; whence he inferred that, as such pebbles could not now pass over the plain of Weymouth, they must have done so before that area was denuded, and when bridged over by the Portland and Purbeck beds; for the pebbles are derived from beds which are only *in situ* to the north of the Weymouth district, and at a distance of eight or ten miles from Portland. Further, this transport must have taken place before the elevation of the north end of Portland, and when the slope from the Bill to the Ridgeway was uniform and gradual. The anticlinal line, which has elevated the intermediate area, must be of later date than the drift-bed. The author next proceeded to notice the raised beach at the Bill of Portland, in which he had, with the assistance of Mr. Jeffreys, determined twenty-six species of shells, two of them not now living in the British Channel, and one new. This beach contains pebbles of the Devonshire and Cornwall rocks. The raised beach Mr. Prestwich found to abut against an old cliff that had been swamped at a later geological period by a land-wash, which had levelled it and the old sea-land with the adjacent land-surface. The mass which had thus swamped the cliff and buried the beach consisted of loam and angular débris, the latter being in larger proportion at top. In the loam he found several species of land and fresh-water shells and fragments of bones. The angular débris consisted of pieces of the local rocks, together with a number of specimens, which by their organic remains were shown to belong to the Middle Purbecks, a part of the series not now existing in Portland. A similar bed, but much thicker, was then described at Chesilton, in the north of the island. It is there sixty feet thick, and contains large blocks of Portland stone and Portland chert, the greater number of which are in the upper part of the deposit, which is here on the sea-level, and 400 feet lower than the Portland escarpment which rises above it. This loam and angular débris the author was disposed to attribute to a temporary submergence of the land to a depth exceeding the height of Portland, and by which the land as it emerged was swept, and its débris carried down to the lowest levels, with the remains of its land animals and land and fresh-water shells, which latter, where protected by large masses of loam and suddenly entombed, have been preserved uninjured. To this deposit, which is common over the raised beaches on the south coast, the author proposed to apply the term "Land-wash." The paper concluded with a short notice of the drift-beds formed subsequently to the denudation of the Weymouth district, and therefore never on the high-level Portland drift. Amongst these was one near Weymouth of singular character, consisting almost entirely of subangular fragments of Greensand chert, which could not have been derived from beds nearer than Abbotsbury. The lower drift of the district is the valley-gravel of Upway and Radipole, in which the remains of the *Elephas primigenius* have been found.

Basalt.—In reply to some of Mr. H. P. Malet's queries on this subject, in the June number of Science-Gossip (p. 139), I may refer him to a paper by the late Prof. Fownes "On the Existence of Phosphoric Acid in Rocks of Igneous Origin." This paper was read before the Royal Society on April 25th, 1844, and published both in the *Philosophical Transactions* (1844, part i. p. 53) and in the *Edin. New Phil. Journal* (xxxvii. 1844, p. 294). Fownes's researches showed that phosphoric acid exists in the lavas of Vesuvius and in some of the old Rhenish lavas; not to mention other rocks to which an eruptive origin may fairly be attributed. Moreover, Sullivan detected phosphoric acid in obsidian from the Lipari Isles; C. Sainte-Claire Deville found from 1·4 to 2·2 per cent. of phosphate of lime in the lava erupted from Vesuvius in 1855; and Kosmann has recorded 0·58 per cent. of phosphoric acid in the basaltic lava from the Puy de Colière, in Auvergne. As to basalts, they commonly yield phosphoric acid when carefully examined. "It almost seems," says Zirkel, "as though we should find phosphoric acid in most basalts, if we only sought specially for it, or tested a sufficiently large quantity of the rock. And it cannot be doubted that the apatite existing in the basalt is the source of this phosphoric acid." ("Basaltgesteine," 1870, p. 72.) Microscopic crystals of apatite are, indeed, extremely common in basalts, and they also occur in many other rocks to which an igneous origin is commonly attributed. A list of these apatite-bearing rocks will be found in Rosenbusch's "Mikroskopische Physiographie," 1873, p. 221. On the disintegration of a rock its phosphates pass into the soil, whence they are abstracted by growing plants, and thus pass ultimately to the animal organism, where they are concentrated in certain tissues, such as bone. On the decomposition of the animal matter, the phosphates are returned to the soil, and the cycle of changes is thus completed. It is clear, however, that all soils do not derive their phosphates from organic sources; a sheet of recently-erupted lava, for example, may be extremely fertile, and the plants growing in such a situation must needs obtain their phosphates solely from the mineral constituents of the lava. Indeed phosphatic minerals, so far from being absent from rocks of igneous origin, are among their most common constituents. "There can be little doubt," says Fownes, speaking specially of mineral phosphates, "that the matter erupted from time to time from the interior of the earth, in a state of fusion, is thus destined to renew the surface, from which the more valuable and more soluble components have gradually been removed by the action of water, and other causes constantly in operation." With reference to the occurrence of *olivine* in basalt, little need be said. As Mr. Malet speaks of olivine as "a product of salicine, which is formed of the bark and leaves of trees," it is clear that he is not referring to the olivine of the mineralogist. Unfortunately Mulder many years ago applied the name of olivine to a resinous substance obtained by the action of certain reagents on salicine; yet it need hardly be said that this rare chemical product, now almost forgotten, does not occur in basalt. The olivine which does occur there is a silicate of magnesia, containing more or less iron. This mineral is not only one of the most common accessory constituents of basalt, but is also found in certain lavas, the igneous origin of which is of course indisputable. It appears, therefore, that the occurrence of apatite and olivine in basalt can hardly be used as an argument in favour of Mr. Malet's view of the origin of this rock. He has told us, in "The Circle of Light, or Dhawalegeri," that "basalt is a hard, colourless, dark rock, such as would be formed under the water, ere light gave her colours to the world." Mr. Malet, however, does not stand alone even in the present day, in denying the igneous origin of basalt. The Neptunian theory is advocated, for example, with much ability, in Dr. Mohr's "Geschichte der Erde" (Bonn, 1866).—*F. W. Rudler.*

THE STEPPES OF SIBERIA.—A paper on this subject was read at the last meeting of the Geological Society by Thomas Belt, Esq., F.G.S. The author describes the portion of the Siberian steppes traversed by him as consisting of sand and loam. The best section seen by him was at Pavlodar, where he found one foot of surface-soil, twenty feet of stratified reddish-brown sand, with lines of small gravel, eight feet of light-coloured sandy silt, fifteen feet of coarse sand, with lines of small pebbles and one line of large ones, and six feet of clayey unlaminated silt, with fragments of the bed rock in its lower half, the bed rock being magnesian limestone much crushed at the top. South of Pavlodar the surface was covered with pebbles, which became larger in advancing southward, until the soil was full of large angular quartz boulders. Further south the bed-rock comes to the surface in ridges and low hills, increasing in height until some of them attain 2,000 feet. All the rock-surfaces were much shattered, as if by the action of frost, but they showed no signs of glacier-action. The ridges and hills were separated by plains composed of sandy clay, with numerous angular fragments derived from the rocks in the immediate neighbourhood. This is accounted for by the author on the supposition tnat they formed a series of shallow lakes, frozen over in winter, and that the ice on breaking up carried away fragments of the rocks. The distribution of the boulders on the plain north of the ridges was also attributed to floating ice. The generally accepted marine origin of the great plain was said to be negatived by the absence of sea-shells in its deposits, whilst *Cyrena fluminalis* occurs in them. The author regards them as deposits from a great expanse of fresh water kept back by a barrier of polar ice descending far towards the south. In its greatest extension this ice-barrier would produce the crushing of the bed-rock; and as it retreated, the water coming down from the higher ground in the south would cover a continually increasing surface.

THE HEMATITE DEPOSITS OF WHITEHAVEN AND FURNESS.—J. D. Kendall, Esq., F.G.S., has recently read a paper on this subject at the Geological Society. The writer states that the deposits of hematite occur in the Silurian and Carboniferous rocks, but chiefly in the latter, and nearly all those worked in the two districts are found in the Mountain limestone. They occur at all levels in the limestone, and generally near faults; their dip is the same as that of the beds in which they lie. Their longest axis almost always corresponds with the magnetic meridian. Their internal nature varies at the two localities. The Whitehaven hematite is much more compact than that of Furness. In the latter place it contains fossils from the Carboniferous limestone. The author considers the hematites to have been deposited by water, coming probably from the coal-measures, containing bicarbonate of iron. The author believes that they were probably deposited after the Millstone-grit but before the Permian.

A LARGE STRUTHIOUS BIRD FROM THE LONDON CLAY.—Harry Govier Seeley, F.L.S., F.G.S., has just described the tibia of a fossil bird from that rich store-house the Isle of Sheppey. The author describes the distal portion of a right tibia of a large struthious bird from the London Clay of Eastchurch in Sheppey. The only living types approximating to it are the Apteryx, which similarly has the shaft at the back of the distal articulation, and the Emu, which similarly has the shaft compressed from back to front. The author considered that the skull named by Prof. Owen, *Dasornis*, might, if it belonged to a bird, be referred to *Megalornis*; but he detailed considerations which led him to suggest that *Dasornis* may possibly be a fish.

NOTES AND QUERIES.

PRESERVING ANIMALS, &c.—In reply to "D. H." (Antrim), respecting obtaining skeletons of animals otherwise than by placing the bodies near ants' nests, the following is the plan usually adopted by naturalists:—Carefully skin the animal and remove the entrails, then place the body in soft (rain) water, changing the water as soon as discoloured, till all the blood is soaked out and decomposition takes place, when the flesh may be removed with a hard brush. In the foregoing proceedings, great care must be taken not to strain or break any of the ligaments which surround the bones. When all the flesh has been removed, the skeleton may be set up, supporting it with fine brass wire where necessary. Then the ligaments may be cut off close to the joints with a sharp pair of scissors, and the skeleton must be put in an airy place to dry, but not in the sun or near the fire, as that will turn the bones a bad colour. By the above plan, with patience and care, "D. H." will be able to obtain good skeletons. —*W. Z. Chivers.*

ANCIENT TREES.—In SCIENCE-GOSSIP for June, one of the contributors on this subject, "hopes that the ancient trees of this country will all soon be recorded." I have read with extreme interest the brief mention of many an ancient denizen of the forest, &c., but have failed to observe any reference to some venerable oaks and a very old yew, which, in former years, I saw very frequently. When I was a boy at school in Gloucestershire, I used to visit a friend at Bitton, near Bath, and sometimes we went to church together, at the picturesque village of Oldham. In the churchyard was a grand old yew, which at first sight had the appearance of three very large trees, the trunk having been divided down to the very base. One Sunday morning after church I was sitting under the shade of its wide-spreading branches, when I remember hearing the clergyman of the district describing the old church and its surroundings to some visitors. "And," said he, "this fine old yew is known to be over a thousand years old, and we have a record of its having been split by lightning about 150 years ago, and thus it has the appearance, you see, of a group of three distinct trees." One portion of this severed yew was tolerably erect, but the other two leaned downwards, at an angle so acute, that visitors could easily step between each portion; and, but that the character of the inner sides indicated fracture, it was hard to believe that they were not three distinct individuals. Of the oak-trees, which I have not seen for nearly twenty years, one was at Cheshunt, in Herts, growing close to the main road. I was told it was mentioned in "Doomsday-book." It is not of very great size as regards height, and, so far as I remember, was quite hollow in the trunk, and what few branches capable of bearing foliage remained, formed a kind of crest at the top of one side only, the sap being, as I presume, conveyed upwards chiefly through the bark on that side of the trunk. At the time I saw it, there was a talk of removing it on account of its obstruction to traffic; but the people of the neighbourhood would not hear of such a thing, and so I suppose the venerable ruin is still standing. The other oaks were also in Herts; one adorns the gardens at Panshanger, where, by the way, in one of the rooms of the mansion, there are two most beautiful pictures by Salvator Rosa. The age of the tree must be very great, but I did not hear it stated. The last time I saw it was during summer, and being in splendid foliage, the cool shade under its leafy canopy was very delightful. The circumference of its extended branches covered an area of 170 yards. I did not measure the trunk, but its size was very great. The other oak is at Northaw, about two miles from the Potter's Bar station. It stands inside a plantation close to the road, and one of its lateral branches extends entirely across the road and droops over the hedge on the other side. Many of the readers of Science-Gossip have doubtless visited Berry Pomeroy Castle, in Devon, and of course all who have been there will have seen the great beech-tree in the wood hard by. This is said to be the finest beech in England. The country people there tell visitors that if they walk three times round this tree without speaking, their wish, whatever it may be, will be gratified. This saying in my case certainly was verified, for as the tree stands on the side of a steep hill, and the base of the trunk projects here and there most inconveniently, it was so extremely difficult to walk round it, even once, that the uppermost wish in my mind was never to undertake the fatiguing task of walking round it again, at least, not three times in succession. I may also refer to those ancient and very extraordinary oaks on Dartmoor, at that strange wild rocky place called "Wistman's Wood" by some, and "Wiseman's Wood" by others. The oak-trees here are mere dwarfs in size, being barely six feet high, but the branches at the top spread out horizontally to an unusual size. These trees are said to have been standing in the time of the Druids, and, if so, formed part of the sacred groves. Strange tales are told in connection with these weird-looking trees and the desolate rocky place where they stand.—*W. H. Grattan.*

The Seven Ash-trees in Tewin Churchyard.—I am sorry that the apparently unfounded aspersion upon the character of Lady Anne Grimston should have received additional currency through the medium of Science-Gossip. Those interested in the growth and details of a legend which seems to have been invented to account for a curious phenomenon, should consult *Notes and Queries*, 4th series, vol. vii. pp. 76, 128, 172, 195, 273, 309, from which they will learn that "abundant evidence exists of both the Christian life and Christian faith of Lady Anne Grimston."—*James Britten.*

Preserving Insects.—Wishing to preserve the insects I capture during the summer, for dissection during the winter months, I am at a loss to know what is the best preservative to use, and should feel obliged for any hints on the matter from some of our gossipers. Spirits of wine, I know, is good, but it seems to harden, toughen, or otherwise destroy the original character of the integument.—*Ento., Hull.*

The Tortoise.—It is certainly a rare occurrence for tortoises to lay eggs in this country, but they occasionally do so, and in some instances the eggs have been artificially hatched. I would refer Mr. Williams to Science-Gossip, vol. vii. pp. 208 and 263. With regard to the egg discovered inside the skeleton, it is not an uncommon thing to find perfect eggs in the ovaries of dead hens. It would be interesting to know how long a time elapsed between the laying of the second egg and the death of the tortoise; and whether, as is the case with the hen, the first eggs would not have commenced to develop until the last one was deposited. The egg of *Testudo Græca* is white, spherical, and about the size of a gall-nut.—*E. Halse.*

Golden Eagles.—On looking over Science-Gossip for 1872 I find a note about a Golden Eagle having been killed at Oare, Somerset, and the following month a correspondent, "G.," doubts it being a Golden Eagle. I recollect the circumstance of the eagle being killed perfectly well. It was wounded by Mr. Snow, and killed by his keeper on the following day; it was killed in Mr. Snow's deer park, on the borders of Devon and Somerset. It is without doubt a Golden Eagle, as Mr. Snow himself informed me, and my brother has seen it. Should, however, any one doubt it, Mr. Snow would, I am sure, allow him to gratify his curiosity. It would well repay the trouble by the beautiful scenery, and should he be fond of fly-fishing, he could obtain plenty of sport.—*Arthur Smyth, Parracombe, Barnstaple, Devon.*

"Half-hours in Green Lanes." — If "P. Barker" wants to know anything respecting the above book, I can tell him it is a charming little work, and I have derived great amusement and information from it, also aid in regard to microscopic objects.—*H. E. W., Berry Grove.*

A Chicken hatched by a Pigeon.—A friend of mine, Mr. H. Cross, 1, Pelham-street, Brick-lane, has related to me the following remarkable circumstance. Mr. Cross keeps a number of pigeons, and last month his man finding a pair about sitting on *one* egg placed a full-sized hen's egg under the pigeon: *both* eggs were hatched at the expiration of *nineteen* days, on June 1st. What conclusion can be drawn from this? is there more warmth in the pigeon's body, than the hen's? Both pigeon and chicken (the latter is being reared by hand) are alive, and Mr. Cross or his man will show them to any one who may call.—*Aaron Solomon.*

To Poultry-keepers. — A few days since, a fine black Spanish hen was found dead in our poultry-yard, with her beak open, and some substance within it. On drawing this forth, it proved to be a mouse, which had become fixed head downwards in the poor bird's throat. The hen was still warm when the discovery was made. It appeared as though the mouse in its struggle to escape, had forced its way down the fowl's throat, and so caused the death of both.—*E. M. P.*

MOTHS' WINGS.—Entomological writers in their instructions how to distinguish butterflies from moths, give four characters;—the two principal ones are: 1st. The antennæ in butterflies have a knob at the end; moths are always without knob, and are generally longer and fine at the end. 2nd. When a butterfly is at rest, its wings are always upright and pressed together back to back, whilst a moth rests with its underwings folded round its body, the upper wings only being visible. One evening I caught what I supposed was a butterfly, and put it in the killing-box with some moths, but on returning home, I could not find the butterfly at all. Some little time after I again caught what I thought was a butterfly, but on examining it by the lamp, I found it to be a moth with its wings upright like a butterfly, and to the best of my recollection, it was the small Phœnix moth (*Cidaria silaceata*). Since then I have frequently caught moths with this peculiarity, but they all belonged to the tribe of Geometers.—*Arthur Smyth.*

REMARKABLE TREES IN TEWIN CHURCHYARD.—A few observations on "J. R. S. C.'s" article may not be out of place. Some days since I visited the tomb out of, and around which the trees grow. I counted seven trunks of ash. The bases of the trunks had grown together, so that it was impossible to say how many trees there are. "J. R. S. C." does not mention that three trunks of sycamore occupy one side of the tomb. So altogether there are ten trunks. The original iron railing round the tomb is in some places entirely hidden, the wood of the trees having quite overgrown it. The stones at one corner are burst quite open, so that the brickwork in the interior of the tomb can be seen distinctly. The old wood railings have been removed, and tall iron railings substituted, which effectually prevent visitors from carving their monograms in the bark of the trees. Both sycamore and ash bear samaroid or winged fruit, which might be blown by the wind into the joints of the tomb and there germinate, which would account for the trees growing there. Still I think it a very remarkable occurrence. It is still more strange that the trees were not removed when young. With difficulty I made out the date. It is 1713. This was the year when Lady A. G. was buried.—*Thomas B. Blow, Welwyn.*

COCKROACHES OR BLACKBEETLES?—"J. F. R.," in SCIENCE-GOSSIP for June, speaks of a correspondent being infested with "either blackbeetles or cockroaches." Does he mean to imply that blackbeetles, as they are called, are not cockroaches?—*R. R. Warrington.*

THE NOCTULE BAT (*Noctulinia altivolans*).—One evening in July, 1871, I was passing some beech and elm-trees near my residence here, and hearing a loud humming, as of insects, I looked up, and saw a perfect swarm of the late cockchafers—Summer Dorrs they are called, I believe—flying high in the air round the trees, and among this buzzing host sailed and swooped five of the largest bats I had ever seen. Whether the bats were feeding on the dorrs or not, I am unable to say, as the height at which they were flying prevented my seeing this. These bats I have since discovered were without doubt members of the above species. A specimen which came into my possession on the 24th of March last, measured 13½ inches in extent of "wing"; it is therefore appropriately called the Great Bat. It occurs most commonly in July, and is seldom seen singly. Its flight is rapid and powerful, and more commonly exercised in a straight line than that of the smaller bats; it is likewise accompanied with a rattling noise. My specimen was a male, and this induces me to ask—Has the female noctule ever been taken? White of Selborne, who first placed this bat on the British list, had suspicions that it was merely the male of the smaller species. I find the people hereabouts are well acquainted with the noctule, and style it the "Bat-rat." The small bat is known as the "Bat-mouse." On p. 67 of this magazine for the present year, in a short notice of the Barbastelle Bat (*Barbastellus Daubentonii*), I said I did not believe that the specimen in question was hybernating where it was found. This I find on further inquiry was incorrect, as it was in reality in that state, and had to be hustled and shaken before it could be roused from its torpor.—*W. H. Warner, Kingston, Abingdon.*

POISONOUS EFFECTS OF A VIPER'S BITE.—A bricklayer living at Andover, named Charles Chandler, was bitten by what he supposed to be a harmless snake, and has suffered a great deal of pain in consequence. I draw particular attention to the matter, because some statements I made a few years ago in SCIENCE-GOSSIP, relative to the dangerous effects of vipers' poison, were doubted. Charles Chandler saw the reptile in the road near a small public-house, into which he carried it for the purpose of inspection, and when placed on the table it darted at him and bit him on the forefinger of his right hand: the pain became in a short time most intense, and the finger very discoloured; so Chandler went off to Dr. Latham, who directly cauterized the wound. The pain extended all the way down the arm from the finger to the shoulder, and the man was exceedingly ill. There was considerable sickness, accompanied by great coldness of the system. The adder is supposed to have been brought into the town from "Harewood Forest" in a bundle of fagots, a dealer, living in East-street, having discovered several of these reptiles on his premises from time to time this spring, and destroyed them immediately; but the one in question had probably made its escape from the yard, and was *en route* for the country when Chandler met it.—*H. E. Watney.*

INSECTS AND FLOWERS.—In the last number of SCIENCE-GOSSIP, some observations of Sir John Lubbock are referred to, indicating that bees can distinguish colours. It would appear that some moths can appreciate resemblances in form and colour, as I was assured some time ago that a humming-bird hawk-moth entered a room here, and went from flower to flower in the pattern of the wall-paper, evidently mistaking them for the real thing and probably much disappointed at the want of flavour.—*George Guyon.*

HAWKS.—I have noticed in several hawks (apparently sparrow-hawks) that have been shot near me, a peculiarity not mentioned in any book that I know of. Over each eye is a hard, prominent, bony, sharp-edged, arched eyebrow. What is the use of this? Is it a protection to the eye when the bird suddenly pounces from a height?—*S. T. P.*

NOTICES TO CORRESPONDENTS.

We must remind our friends, who make use of this column, that the following rules should be strictly adhered to:—First. That perfect specimens be sent. Secondly. That all the information as to habitat, &c., that the inquirer can give should be forwarded with them. Thirdly. To bear in mind that drawings, unless very perfectly executed, are useless, and a tyro is very apt to omit some distinctive characteristic which would enable the examiner to decide the genus and species of the object sent. Lastly. Never to send an object for identification until the inquirer has used his best endeavours to find out for himself all the information he requires. Questions are very frequently sent, which the slightest effort on the part of the querist, in looking through some elementary treatise, would have given all the knowledge required.

Geo. Barnes.—The "Hair-worm" (*Gordius uquaticus*) is the name of your specimen. It usually lives in water, but passes its earlier stages as a parasite in insects.

H. H. C. wants to know the English and scientific name of the bird commonly known as the "Call Duck."

Mrs. G. Hoare.—See the articles in Science-Gossip for June 1872, January 1873, and March 1872, for information as to the food and general habits of the water newt when kept in aquaria.

F. B.—Your specimen of *Daucus carota* showing retrogression of the carpels is very curious. We have not seen the phenomenon before.

A. R. G.—The "growth" on the leaves of a larch tree are the stalked eggs of the Lace-wing fly.

W. H. J.—You will find the description of how to make a botanical vasculum in most elementary botanical works. Why not procure one at some natural history dealer's in London?

Geo. Smith.—Your specimen is the male catkin of the Goat Willow (*Salix caprœa*). In the northern counties these catkins, when in full bloom, are commonly called "palms,' chiefly, perhaps, because they are in bloom about the time when Palm Sunday falls.

J. T. Bean.—You will find several methods of destroying ants in the "Notes and Queries" columns of Science-Gossip for 1873, and the present year.

S. A. Noncutt.—The plant with spike of small yellow flowers is *Galium verum*, or "Yellow Bedstraw;" the Tormentil is *Potentilla tormentilla*.

J. Green.—Accept our thanks for the packet of foraminiferous silt.

E. C. R.—Accept our best thanks for your valuable correction.

W. M.—Will this contributor (who offered material for mounting in last month's "Exchange" column and forgot to send us his address) now forward it, as we have several letters for him?

R. W. (Westward).—Your Carex is not allied to either *vesicaria* or *ampullacea*, but is a small form of *Carex pendula*, Huds.

C. T. (Brighton).—Your umbelliferous plant is the wild state of *Pastinaca sativa*, L. It differs very much from the cultivated variety: we do not wonder that you have been puzzled.—J. F. R.

W. Smart, M.D.—The specimen inclosed is a Valerian, not however, a British plant: it is the true *Valeriana Phu*; it is strange, however, it should be called "Sidwell." Probably this name is intended for the *V. officinalis*, L. Would you kindly send us your opinion upon this interesting point?—J. F. R.

F. H. A. (Fishbourne).—The inclosed grass is a stunted form of *Phleum pratense*, L. The barren field will explain why it is so small.—J. F. R.

H. J. McG. (Walford).—No. 1 is a very poor specimen, but it is probably *Carex dioica*, L. No. 2, *Carex curta*, Good: the one not labelled is also *C. curta*, perhaps your duplicate. No. 3, *Carex panicea*, Linn.—J. F. R.

E. E. (New Brighton).—The plant marked No. 3 is *Erythrea linarifolia*. It is a most variable species; we have met with numerous forms on the N.B. sand-hills, sufficient almost to puzzle a philosopher. No. 14 is not an *Inula*. The specimen was broken and crushed, so as to render identification impossible.—J. F. R.

T. B. S.—The place where the *green* fluor spar is most abundant in Great Britain is Alston Moor, Cumberland.

T. Jones.—No better elementary manual than Cooke's "Microscopic Fungi" (London: Hardwicke) is to be obtained.

W. Knowles.—See article in Science-Gossip, vol. for 1872, on "Collecting and Preserving Fungi," by Mr. Worthington Smith. It will give you all the information you require as to preserving fungi.

Querist.—Your specimen is not a fossil plant, but a sponge. They are not uncommon in flint nodules.

To Correspondents.—We have been obliged (through absence from home) to postpone acknowledging communications this month.

EXCHANGES.

For packet of Foraminiferous Silt, partly prepared, send mounted object of interest to J. Green, Causeway Villa, March, Cambridgeshire.

Collections of Malta and Gazo land and fresh-water shells, for others.—H. W. Feilden, 101, Strada Bretanica, Valletta, Malta.

I have duplicates of a dozen rare plants and am in want of *Hyoscyamus niger* and *Conium maculatum*.—H. Higginson, New Ferry, Birkenhead.

Wanted, a quantity of smooth-skinned Larvæ, large Grass-hoppers or other insects suitable for dissection, alive or fresh killed; Microscopic and Entomological Books and other things.—J. S. Harrison, 48, Lowgate, Hull.

Larvæ of *Piniperda*, *Menyanthidis*, *Fuliginosa*, for other larvæ or pupæ; silkworms preferred.—A. Pickard, Wolsingham, Darlington.

Desiderata: *Sinapis*, *Daplidice*, *Hyale*, *Lathonia*, *Pruni*, *Betulœ*, *Acis*, *Arion*, and *Pansicus*. Duplicates: *Alsus*, *Corydon*, *Ægon*, *Quercus*, *Rubi*, *Galathea*, *Adippe*, *Paphia*, and *Semele*.—R. I. Stent, 70, Queen-street, Portsea.

Duplicates: *Tersœta*, *Emarginata*, *Adustata*, *Marginata*, *Chrysorrhœa*, *Jacobeœa*, and *Filipendulœ*. Desiderata: *Cytisaria*, *Viridata*, *Smaragdaria*, *Ornata*, *Dealbata*, *Ulmata*, *Hastata*, and *Tristata*.—E. R. Roberts, 104, Fratton-street, Portsmouth, Hants.

Epithemia Hyndmanii, *E. Zebra*, *E. Argus*, *Hydroseira triquetra*, *Triceratium favus*, for well-mounted Slides of other Diatoms named.—Send list to M. D., The Esplanade, Deal.

I should be glad to exchange specimens with any one collecting British Coleoptera.—James Walkden, 150, Stock-port-road, Manchester.

Rare Shells offered: *Clausilia rugosa*, var. *Schlechtii* (new variety recently determined by Mr. Jeffreys), *Helix obvoluta*, *Helix revelata*, *Pisidium cinereum*, *Achatina acicula*, *Clausilia dubia*, for *Pupa unglica*, *P. pusilla*, *P. antivertigo*, *P. substriata*, *P. Venetzii*, *P. alpestris*, or *Tstacellus* or *Succinea oblonga*.—W. F. Sutton, Gosforth Grove, near Newcastle-on-Tyne.

Dried specimens of 78, 174, 274, 276, 395, 694, in Lon. Cat. for 47, 83, 77, 110, 111, 131.—Address, Miss Howorths, Burnley.

For *Erysephe montapnio* on Burdock, send stamped envelope to T. Brittain, 52, Park-street, Green Heys, Manchester. No exchange required.

Firt-class Micro Slides offered for Mole Crickets, great Green Grasshoppers, Field Crickets, Locusts, or good Foreign Species of Grasshoppers, Crickets, &c., any quantity during season.—C. L. Jackson, 11, Hesketh-street, Southport.

For Palate of *Trochus ziziphinus* and *Chiton* (unmounted), send stamped addressed envelope to Jas. Lumsden, 197, Dorning-street, Wigan. Any good object acceptable.

Well-mounted and prepared Diatomaceæ from Richmond, Virginia, or Yarra Yarra, for Diatomaceous Material and pieces of Holothuriæ, cleaned or uncleaned.—H. B. Thomas, Boston, Lincolnshire.

BOOKS, &c. RECEIVED.

"Monthly Microscopical Journal." August.

"Journal of Proceedings of the Winchester and Hampshire Scientific Society."

"Sulphur in Iceland." By Dr. Carter Blake. London: E. & F. Spon.

"Smithsonian Report." 1872.

"Ben Brierley's Journal." July.

"Monthly Journal of Education." August.

"Proceedings of the Bristol Naturalists' Society." New Series, vol. I. part I.

"Monthly Report of Department of Agriculture." For June.

"Boston Journal of Chemistry." July.

"Bulletin of the U. S. Geological Survey of the Territories." No. 2.

"Synopsis of the Flora of Colorado." By J. C. Porter and J. M. Coulter. London: Trübner & Co.

"Canadian Entomologist." No. 6.

THE HISTORY OF OUR CULTIVATED VEGETABLES.

No. V.—THE TURNIP (*Brassica Rapa*).

THE Turnip, as before stated, belongs to the same class as the Cabbage; it is a biennial plant, and a frequent weed of cultivation found in the borders of fields and waste places in Europe, and in the temperate and subtropical climates of Asia. In this state the root-leaves are large, of a deep green colour, very rough, jagged, and gashed. In the second season it sends up a flower-stalk with leaves embracing the stem, smooth, glaucous, oblong, and pointed; the flowers and pods resemble those of the cabbage, but the petals are of a much brighter yellow. The varieties both under garden and field culture are very numerous, while these again differ with soil and climate and manner of cultivation.

The turnip was known to the Greeks, who called this vegetable Gongyle, from the roundness of its roots. It is said to have been introduced into Greece and Italy from Gaul. The ancient Greeks appear not to have used it much as an article of diet, but more as a medicine, for cataplasm, and as an external application to recover frozen or benumbed feet, being first boiled in water and then applied as a fomentation. Democritus, the celebrated philosopher of Abdera, who lived in the 5th century B.C., banished turnips altogether from the table, on account of their engendering flatulency; while Diocles, a physician of the next century, on the other hand, extolled these roots as much as the former philosopher had condemned them. By the Romans they were much esteemed. Cato mentions them as being cultivated at Rome in his time; Pliny, in his Nat. Hist., writes thus of the turnip, which he says is pretty nearly the same in nature as the Rape (*B. Napus*) and thrives equally well in a cold soil. The proper time for sowing both kinds is the period that intervenes between the festivals of the two divinities Neptune and Vulcan (23rd July and 23rd August). It is said too—and it is the result of very careful observation—that these plants will thrive wonderfully well, if they are sown as many days after the festival of Neptune as the moon was old when the first snow fell the previous winter. They are sown in spring as well, in warm and humid localities. The more careful growers recommend that the ground should be turned up five times before putting in the turnip, and four for rape, care being taken in both cases to manure it well. Rape, they say, will thrive all the better if it is sown together with some chaff. He also states that the sower ought to be stripped, and that he should offer a prayer while sowing, and say, "I sow this for myself and my neighbours."

From all that can be gathered from the writings of the ancients, it is probable that the turnip occupied nearly the same place in Roman culture as it does in the British husbandry of the present day. Columella recommended that the growth of turnips should be abundant, because those which were not required for human food could be given with much advantage to cattle, and both Pliny and he concur in their testimony that this produce was esteemed next to corn in utility and value. Columella states that turnips were particularly abundant in Gaul, and that the inhabitants fed their cattle with them. The best turnips, according to Pliny, grew in the country of the Sabines, and were worth at Rome a sestertius, or twopence, each. It is related that when the Samnite ambassadors visited Manlius Curius they found him cooking turnips by the embers of his watch-fire, and when they displayed the treasures which were intended to bribe him, this great man, pointing to the pot in which his vegetables were boiling, answered with contempt, "I prefer my earthen pots to all your vessels of gold and silver; and it is my wish to command those who are in possession of money, while I am deprived of it and live in poverty."

It is most probable that the garden culture of this vegetable was introduced into this country with some others by the Romans, but I do not find any mention of it until the 16th century; and it has been disputed whether the cultivation of it was revived by nature, industry, or introduced at that period by the Flemings.

In the time of Henry VIII. they were eaten baked, or roasted in the ashes, and the young shoots used as a spring salad; during the reign of Elizabeth boiled turnips were a favourite dish. Shakespeare makes mention of them in the "Merry Wives of Windsor" (Act 3rd, Scene 4th), where "Sweet Ann Page," while resisting Master Slender's suit, appeals to her mother thus: "Good mother, do not marry me to yond fool. Alas! I had rather be set quick i' the earth and bowl'd to death with turnips."

From the remarks of Gerard, it would appear that turnips were not much grown in his time, except for domestic purposes. He says of this root, "It groweth in fields and divers vineyards or hop-gardens in most places of England. The small turnip groweth by a village near London, called Hackney, in a sandy ground, and are brought to the Cross in Cheapside by the women of that village to be sold, and are the best I ever tasted. The bulbus or knobbed root, which is properly called rapum or turnip, and hath given the name to the plant, is many times eaten raw, especially by the poor people in Wales, but most commonly boiled." Cogan, in his "Haven of Health," published in 1597, says, "that although many men love to eat turnips, yet do swine abhor them." Parkinson, who wrote in 1629, mentions them as vegetables cultivated in gardens only. In 1668 Worledge published the "Mystery of Husbandry," in which he says, "that although turnips be usually nourished in gardens and be properly a garden plant, yet are they to the very great advantage of the husbandman, sown in his fields in several places in England, not only for culinary uses, as about London and other large cities, but also for food for cattle." Miller, in his "Gardener's Dictionary," published 1737, describes two kinds of round turnip, one with white and the other with purple roots; also a yellow and long-rooted sort, which he says was formerly more cultivated than at present, for it is now very rare to see either of these brought to the markets, though some years since they were sold in as great a plenty as the commoner kind.

Gardening and agriculture are in some degree allied in their progress and results. Vegetables that have been first introduced as luxuries into our gardens have in time become staple productions of our fields; and the introduction of turnip-husbandry is one of the most important events in the history of British agriculture. It is said Sir Richard Weston recommended them as an object of field-tillage about the middle of the 17th century; but the cultivation did not make much progress until 1730, when Lord Townshend introduced the culture of them on his estates at Rainham, in Norfolk.

Until the commencement of the last century an extensive tract of land of the north-east angle of that county continued very nearly in the state of nature, being a district of sheep-walks and rabbit-warrens, and a large portion of the soil of a very inferior quality. About the year before mentioned, Lord Townshend, attending King George I. in one of his excursions to Germany, in the quality of Secretary of State, observed the turnip cultivated in open and extensive fields, as fodder for cattle, and spreading fertility over lands naturally barren. On his return to England he brought over some of the seed, and strongly recommended the practice he had witnessed to the adoption of his own tenants, who occupied a similar soil to that of Hanover. The experiment succeeded, and by the zealous exertions of Lord Townshend and a few of the neighbouring landowners, great improvements have been effected, and the country has become one of the most productive agricultural districts in the kingdom. Some of the finest corn crops in the world are now grown on lands which, before the introduction of the turnip husbandry, produced a very scanty supply of grass for a few lean and half-starved rabbits. If we were, therefore, asked to point out the individual who has proved one of the greatest benefactors to the agricultural interest of the country, we should not hesitate to fix upon the ingenious nobleman whom the wits and courtiers of his own day were pleased to laugh at as "Turnip Townshend;" for the turnip-culture which he introduced from Hanover has spread itself throughout this kingdom, and now yields an annual return which probably exceeds the interest of our national debt. In some districts, however, strange prejudices were long entertained against this root as a field crop, and many amusing stories are told of the way in which they were overcome. In Johnson's "Useful Plants of Great Britain," it is mentioned that a landlord in South Wales whose tenants resolutely adhered to their opinion that no sheep would touch the plant, though assured that it already formed the principal winter food of the fine breeds of the east of England, sowed some turnips upon an unfenced field by the roadside; they were greedily devoured by a flock straying from the hills; and by impounding the trespassers he at last convinced their owners that the roots the latter despised were relished by their sheep, and thus succeeded in inducing the stubborn farmers to attempt the cultivation of this valuable crop.

Sir John Sinclair, in his "Husbandry of Scotland," says, "I am informed that the swede turnip was first introduced into this country in 1781–2, on the recommendation of Mr. Knox, a native of East Lothian, who settled at Gottenburge, whence he sent some seeds to Dr. Hamilton." Other authors date its introduction from the same place, but at a somewhat earlier period. Some kinds of turnips are much more easily injured by the frost than others, but the swede is the hardiest of all, and therefore it is sometimes introduced into gardens in cold localities for winter and spring use, on account of the excellent green tops it produces when other greens are scarce. They also, when blanched and forced, make a good substitute for seakale.

The turnip, in some of its varieties, is of very universal culture throughout Europe. In Sweden it is a very favourite vegetable. We also learn from the interesting Journal of Linnæus that even so far north as Lapland, the colonists sow annually a considerable quantity of turnip-seed, which frequently succeeds very well, and produces a plentiful crop. The native Laplanders are so fond of this root that they are often induced to part with a whole cheese in exchange for one single turnip. Dr. Clarke, in his "Travels in Russia," published in 1810, says turnips were used as fruit, and eaten with avidity by all classes. In the houses of the nobility the raw turnip cut in slices is handed about on a silver salver with brandy, as a provocative to a more substantial meal. The first nobleman of the empire, when dismissed by his sovereign from attendance upon his person, may be found throughout the day with his neck bare, his beard lengthened, his body wrapped in a sheep's skin, eating raw turnips and drinking quass.

It is averred that the Roman method of cultivation of the turnip must have been superior to that of the moderns, since Pliny relates that some single roots weighed as much as 40 lb., a weight far surpassing any which has been obtained by the most skilful modern agriculturists. Turnips, if carefully cultivated, sometimes attain a great size in this country, though appearing insignificant when compared with the gigantic roots of the Roman naturalist, which must be an exaggerated statement.

Tull, in his "Horse-hoeing Husbandry," speaks of some turnips weighing as much as nineteen pounds, and of often meeting with others of sixteen pounds. In Surrey, a Swedish turnip, the seed of which had been sown in July, was dug up in October, 1828, which weighed twenty-one pounds, and was one yard in circumference. (Vide *Gardener's Magazine.*) But these are far surpassed by one mentioned by Campbell in his "Political Survey," which was pulled up in 1758 at Tudenham, in Norfolk, and weighed twenty-nine pounds. In the present day we see and hear of some very large turnips being grown and exhibited at our agricultural shows, and that some roots of Carter's Purple-top Mammoth weighed over a stone each. (See *Gardener's Chronicle*, July 4, 1874.) In No. 360 of the *Philosophical Transactions*, we find a curious calculation made by Dr. Desagulier, on the rapid increase of a turnip root. One ounce of turnip-seed was found by him to contain between fourteen and fifteen thousand single seeds; therefore one seed would weigh one-fourteen or one-fifteen thousandth part of an ounce; and assuming its growth to be always uniform, a turnip-seed may increase fifteen times its own weight in a minute. By an actual experiment made on moss or peat ground, turnips have been found to increase by growth 15,990 times the weight of their seeds each day they stood upon it. It is not, however, the size and weight of the root which render this crop so productive; the number contained in a given space, with reference to their size, is very great, and it is generally thought a good crop to obtain a turnip from each square foot of ground; but the produce varies greatly; the rich lands of the north of England have occasionally reached sixty tons to the acre, but seldom reached higher than thirty to forty tons on the best land in the south. The turnip contains but little nutritive matter in proportion to its weight. Dr. Lyon Playfair made the following analysis of the ingredients in one hundred parts:—water, eighty nine; unazotised matter, sugar and starch, nine; albumen, one; inorganic matter, one. According to Von Thuer, one hundred tons of turnips equal only twenty-four tons of meadow hay in point of nutritive value.

The uses of the turnip as a culinary vegetable are too familiarly known to require that they should be here enumerated. Though in very extensive favour among the moderns, the different modes of preparing it appear poor and insipid compared with those efforts of gastronomic skill by which the ancients made it assume so many inviting forms. In the "Curiosities of Literature," it is related that the king of Bithynia, in some expedition against the Scythians, in winter, and at a great distance from the sea, had a violent longing for a small fish called aphy, a pilchard or herring, or an anchovy. His cook cut a turnip to the perfect imitation of its shape, then fried it in oil, salted, and well powdered with the grains of a dozen black poppies; his majesty's taste was so exquisitely deceived, that he praised the root to his guests as an excellent fish. This transmutation of vegetables into meat or fish is a province of the culinary art which we appear to have lost; still, perhaps, it may be revived in these days, when we are likely to have professors in cookery.

It is recorded in the *Philosophical Transactions* that in the years 1629 and 1630, there being a scarcity in England, good white and wholesome bread was made of boiled turnips, deprived of their moisture by pressure, and then kneaded with an equal quantity of wheaten flour; thus forming what was called turnip-bread. The scarcity of corn in 1693 obliged the poor people of Essex again to have recourse to this species of food. In the present day swede turnips are sometimes employed to manufacture a fictitious "orange marmalade," and from the quantity of sugar the roots of this order contain, a liquid is manufactured from them which is said to be used in adulterating light wines. The turnip crop not unfrequently suffers from a fungus of the botrytis kind (*B. parasitica*), allied to that which some suppose causes potato disease. It infests plants of rank growth, attacking their roots, which are weakened by the too great luxuriance of the leaves. Plants during dry seasons are liable to a form of white mould, a species of Oïdium, which attacks the leaves and renders the plant almost worthless—Aubury, or fingers-and-toes, by which large excrescences are produced on the bulbs, and in a short time the whole root becomes in a state of putrefaction: it used to be considered to proceed from the formation of an insect in the tap-root; but Stevenson, in the "Book of the Farm," states that all such diseases are occasioned by the poverty of the soil, and that this disease is not so prevalent as it was fifty years ago, because the culture of the turnip is better understood, and the ground is manured with greater liberality.

According to the agricultural returns of Great Britain for 1873, the number of acres under turnip-cultivation amounted to 2,121,908, and there was more land under turnips and swedes in 1873 than in 1872 by 38,000 acres; but the average of these crops was not equal to what it was in the years from 1868 to 1871. In "London Labour and London Poor" it is calculated that about 32,000,000 of turnips are anually sold in the metropolis.

Pearham pictures the month of November with a bunch of parsnips and turnips in his hand, and Guilum says these vegetables were used in armorial bearings, to represent a person of good disposition who relieved the poor.

H. G. Glasspoole.

NOTES ON THE LEAF-ROLLERS.

THE caterpillars of Lepidoptera, seeking protection by means of habitations constructed of the leaves of their food-plant, are to be found more especially in the tribe of *Tortrices*, or leaf-twisters. The form of the cell is not always similar, some insects rolling the leaf from the tip toward the stem; others making a division in the edge, and thus only employing a part; whilst others spin the edges together, employing one or more leaves for the purpose.

Although the greater number of the leaf-rollers are to be found in the smaller tribes of moths, or Micro-lepidoptera, yet some of the larger species are also endued with the same habit, and among them one or two of the butterflies. To any one who has not tried it, the difficulty of rolling a stiff leaf, like that of the laurel or oak, is scarcely appreciable. To such small creatures as cater-

Fig. 151. Red Admiral (*Pyrameis Atalanta*). Upper side.

pillars the difficulty would seem insurmountable, and the manner in which it is got over by the insect is very interesting. The caterpillar first spins a single thread, beginning from the tip, and fastening off about the centre of the leaf another,

Fig. 152. Ditto (under side).

and then another, until it has a row. This done, it goes over them again, tightening them, and fixing them down. Thus, slowly but surely, the leaf is bent to the required form, and the architect takes possession of its home. It is not to be expected that a house on which so much time and patience has been expended is to be used for any feeding purposes, and thus the leaf-rolling larvæ only *live* between the spun leaves, making nocturnal rambles in search of food, and never failing to find their way back by means of a guide-line of silk thread.

The most common example of a butterfly roller is the caterpillar of the well-known Red Admiral (*Pyrameis Atalanta*). It feeds on the nettle in July and August, and constructs a kind of web, or rather tent, of two or three of the leaves. Its relative, the Painted Lady (*Pyrameis Cardui*), is also a leaf-roller, inhabiting the thistle as well as the nettle, but being found more generally on the former. Another butterfly roller is the Glanville

Fig. 153. Painted Lady (*Pyrameis Cardui*).

Fritillary (*Melitæa cinxia*), but it is more of a web-spinner than a Tortrix, and the cell, or rather roof, is shared in common, the caterpillars being gregarious. Coming to the true Tortrices, we find, as at once the commonest and most interesting, the Oak Tortrix (*Tortrix viridana*), an insect that would be more common than it is were it not a special object of attention to a species of *Empis*, which sucks the blood of the insect vampire-fashion. The wings of the moth are of a bright pea-green colour, which harmonizes well with the leaves, and is no doubt a very efficient protection.

Fig. 154. Ditto (Variety).

The beauties of worm-eaten apples are well known; but few persons, however, are aware of the origin and economy of the little animal that spoils our fruit. This is the larva of the Codlin moth (*Carpocapsa pomonana*), which, though not strictly a leaf-roller, belongs to the tribe of Tortrices. In early summer the parent moth deposits her eggs on the young apples, and these, soon hatching, produce a small white grub, which straightway setting to work, burrows deep into the fruit, taking care, however, to steer clear of the vital parts, to assail which would cause the premature fall of its home. As soon as the caterpillar is full fed, the core is attacked, and the apple falling in consequence, the creature eats its way out, ascends the trunk of some tree, and ensconcing itself in some snug crevice, prepares its cocoon, in which to undergo its transformation. The moth, which appears the following summer, is of a brick-brown tint, and, plain as its colouring, it is not without beauty if examined with the aid of a lens.

There can be no doubt that leaf-rolling is intended as a defensive resource against the weather, birds, and also against those more insidious yet scarcely less dangerous foes to lepidopterous larvæ, the Ichneumons. Against these latter, however, it is not always successful, and the Ichneumon shows such wonderful skill in the discovery of its prey, that one is constrained to attribute it to some power of discrimination of which we are not aware. What this power is, or whence its origin, I must leave the readers of SCIENCE-GOSSIP to determine.

C. LOVEKIN.

NEWS FROM THE "CHALLENGER."

THERE can be little doubt that the naturalists on board this exploring ship are doing good work, and that the results of their investigations will throw much light on many natural history and geological questions. Even within the short period the vessel has been exploring, many new facts have been laid before the Royal, Linnean, and other learned societies. The last news was contained in a letter from the chief of the expedition, Professor Wyville-Thomson, of which the following is a summary. The letter is dated from Melbourne. Observations had then been made at nineteen principal stations, suitably distributed over the track, and including Marion Island, the neighbourhood of the Crozets, Kerguelen Island, and the Heard group.

After leaving the Cape of Good Hope, several dredgings were taken a little to the southward, at depths from 100 to 150 fathoms. Animal life was very abundant; and the result was remarkable in this respect, that the general character of the fauna was very similar to that of the North Atlantic, many of the species even being identical with those on the coasts of Great Britain and Norway.

Marion Island was visited for a few hours, and a considerable collection of plants, including nine flowering species, was made by Mr. Moseley. A shallow-water dredging near Marion Island gave a larger number of species, again representing many of the northern types, but with a mixture of southern forms, such as many of the characteristic southern Bryozoa, and the curious genus *Serolis* among Crustaceans. Off Prince Edward's Island the dredge brought up many large and striking specimens of one or two species of Alcyonarian zoophytes, allied to *Mopsea* and *Isis*.

The trawl was put down in 1,375 fathoms on Dec. 29, and in 1,600 fathoms on the 30th, between Prince Edward's Island and the Crozets. The number of species taken in these two hauls was very large, and many of them belonged to especially interesting genera, while many were new to science. There occurred, with others, the well-known genera *Euplectella*, *Hyalonema*, *Umbellularia*, *Flabellum*, two entirely new genera of stalked Crinoids belonging to the Apiocrinidæ, *Pourtalesia*, several Spatangoids new to science, allied to the extinct genus *Ananchytes*, *Salenia*, several remarkable Crustaceans, and a few fish.

The *Challenger* reached Kerguelen Island on Jan. 7, and remained there until Feb. 1. During that time Dr. von Willemoes-Sühm was chiefly occupied in working out the land fauna, Mr. Moseley collected the plants, Mr. Buchanan made observations on the geology of those parts of the island which were visited, and Mr. Murray and Professor Thomson carried on the shallow-water dredging in the steam pinnace. Many observations were made, and large collections were stored. Two days before the expedition left Kerguelen Island they trawled off the entrance of Christmas Harbour, and the trawl-net came up on one occasion nearly filled with large cup-sponges belonging to the genus *Rossella*, of Carter, and probably the species dredged by Sir James Clark Ross near the ice-barrier, *Rossella antarctica*.

The *Challenger* reached Corinthian Bay in Yong Island on the evening of the 6th, and all arrangements had been made for examining it, as far as possible, on the following day; but a sudden change of weather obliged Capt. Nares to put to sea. Fortunately Mr. Moseley and Mr. Buchanan accompanied Capt. Nares on shore for an hour or two on the evening of their arrival, and took the opportunity of collecting the plants and minerals within their reach. The most southerly station was made on Feb. 14, lat. 65° 42′ S., long. 79° 49′ E. The trawl brought up, from a depth of 1,675 fathoms, a considerable number of animals, including Sponges, Alcyonarians, Echinids, Bryozoa, and Crustacea, all much of the usual deep-sea character, although some of the species had not been previously observed.

Professor Thomson gave a list of the various classes of animals, from Sponges to Teleostei, that were met with in nine successful dredgings, at depths beyond 1,000 fathoms, between the Cape and Australia. Many of them, Professor Thomson states, are new to science, and some are of great interest from their relation to groups supposed to be extinct. This is particularly the case with the Echinodermata, which are here, as in the deep water in the north, a very prominent group.

During the cruise special attention has been paid to the nature of the bottom, and to any facts which might throw light upon the source of its materials. This department has been chiefly in the hands of Mr. Murray; and Professor Thomson gives the following extracts from Mr. Murray's notes:—

"In the soundings about the Angulhas Bank, in 100 to 150 fathoms, the bottom was of a greenish colour, and contained many crystalline particles (some dark-coloured and some clear) of Foraminifera, species of *Orbulina*, *Globigerina*, and *Pulvinulina;* a pretty species of *Uvigerina*, *Planorbulina*, *Miliolina*, *Bulimina*, and *Nummulina*. There were very few Diatoms. In the deep soundings and dredgings before reaching the Crozets, in 1,900, 1,570, and 1,375 fathoms, the bottom was composed entirely of *Orbulina*, *Globigerina*, and *Pulvinulina*, the same species which we get on the surface, but all of a white colour and dead. Of Foraminifera, which we have not got on the surface, I noticed one *Rotalia* and one *Polystomella*, both dead. Some Coccoliths and Rhabdoliths were also found in the samples from these soundings. On the whole, these bottoms were, I think, the purest carbonate of lime we have ever obtained. When the soundings were placed in a bottle, and shaken up with water, the whole looked like a quantity of sago. The *Pulvinulinæ* were smaller than in the dredgings in the Atlantic. We had no soundings between the Crozets and Kerguelen.

"The specimens of the bottom about Kerguelen were all from depths from 120 to 20 fathoms, and consisted usually of dark mud, with an offensive sulphurous smell. Those obtained farthest from land were made up almost entirely of matted sponge-spicules. In these soundings one species of *Rotalina* and one other Foraminifera occurred. At 150 fathoms, between Kerguelen and Heard Island, the bottom was composed of basaltic pebbles. The bottom at Heard Island was much the same as at Kerguelen. The sample obtained from a depth of 1,260 fathoms, south of Heard Island, was quite different from anything we have previously obtained. It was one mass of Diatoms, of many species, and mixed with these a few small Globigerinæ and Radiolarians, and a very few crystalline particles. The soundings and dredgings while we were among the ice in 1,675, 1,800, 1,300, and 1,975, gave another totally distinct deposit of yellowish clay, with pebbles and small stones, and a considerable admixture of Diatoms, Radiolarians, and Globigerinæ. The clay and pebbles, were evidently a sediment from the melting icebergs, and the Diatoms, Radiolarians, and Foraminifera were from the surface-waters. The bottom, from 1,950 fathoms, on our way to Australia from the Antarctic, was again exactly similar to that obtained in the 1,260 fathoms sounding south of Heard Island. The bottom at 1,800 fathoms, a little farther to the north (lat. 50° 1′ S., long. 123° 4′ E.), was again pure 'Globigerina-ooze,' composed of *Orbulinæ, Globigerinæ*, and *Pulvinulinæ*.

"The bottom at 2,150 fathoms (lat. 47° 25′ S., long. 130° 32′ E.) was similar to the last, with a reddish tinge, and that at 2,600 fathoms (lat. 42° 42′ S., long. 134° 10′ E.) was reddish clay, the same which we got at like depths in the Atlantic, and contained manganese nodules and much decomposed Foraminifera."

Mr. Murray, Prof. Thomson goes on to say, "has been induced by the observations which have been made in the Atlantic, to combine the use of the towing-net at various depths from the surface to 150 fathoms, with the examination of the samples from the soundings. And this double work has led him to a conclusion (in which I am now forced entirely to concur, although it is certainly contrary to my former opinion) that the bulk of the material of the bottom in deep water is in all cases derived from the surface.

"Mr. Murray has demonstrated the presence of Globigerinæ, Pulvinulinæ, and Urbulinæ throughout all the upper layers of the sea over the whole of the area where the bottom consists of 'Globigerina-ooze' or of the red clay produced by the decomposition of the shells of Foraminifera; and their appearance when living on the surface is so totally different from that of the shells at the bottom, that it is impossible to doubt that the latter, even although they frequently contain organic matter, are all dead. I mean this to refer only to the genera mentioned above, which particularly form the ooze. Many other Foraminifera undoubtedly live in comparatively small numbers, along with animals of higher groups, on the bottom." It is very curious to note that in the extreme south the conditions were so severe as greatly to interfere with all work. "We had," Prof. Thomson says, "no arrangement for heating the workrooms, and at a temperature which averaged for some days 25° Fahr., the instruments became so cold that it was unpleasant to handle them, and the vapour of the breath condensed and froze at once upon glass and brass work. Dredging at the considerable depths which we found near the Antarctic circle became a severe and somewhat critical operation, the gear being stiffened and otherwise affected by the cold, and we could not repeat it often.

"The evening of Feb. 23 was remarkably fine and calm, and it was arranged to dredge on the following morning. The weather changed somewhat during the night, and the wind rose. Captain Nares was, however, most anxious to carry out our object, and the dredge was put over at 5 A.M. We were surrounded by icebergs, the wind continued to rise, and a thick snow-storm came on from the south-east. After a time of some anxiety the dredge was got in all right; but, to our great disappointment, it was empty—probably the drift of the ship and the motion had prevented its reaching the bottom. In the mean time the wind had risen to a whole gale, force = 10 in the squalls, the thermometer fell to 21°·5 Fahr., the snow drove in a dry blinding cloud of exquisite star-like crystals, which burnt the skin as if they had been red-hot, and we were not sorry to be able to retire from the dredging-bridge.

"The specific gravity of the water has been taken daily by Mr. Buchanan; and during the trip Mr. Buchanan has determined the amount of carbonic acid in 25 different samples—15 from the surface, 7 from the bottom, and 2 from intermediate depths. The smallest amount of carbonic acid was found in surface-water on Jan. 27, near Kerguelen; it amounted to 0·0373 gramme per litre. The largest amount, 0·0829 gramme per litre, was found in bottom-water on Feb. 14, when close to the Antarctic ice. About the same latitude the amount of carbonic acid in surface-water rose to the unusual amount of 0·0656 gramme per litre; in all other latitudes it ranged between 0·044 and 0·054 gramme per litre. From the greater number of these samples the oxygen and nitrogen were extracted, and sealed up in tubes.

"While we were among the ice all possible observations were made on the structure and composition of icebergs. We only regretted greatly that we had no opportunity of watching their birth, or of observing the continuous ice-barrier from which most of them have the appearance of having been detached. The berg- and floe-ice was examined with the microscope, and found to contain the usual Diatoms. Careful drawings of the different forms of icebergs, of the positions which they assume in melting, and of their intimate structure, were made by Mr. Wild, and instantaneous photographs of several were taken from the ship."

A SIMPLE MARINE AQUARIUM.

THE increasing popularity of marine aquaria, and the difficulty of obtaining the best kind of tank, except at a high price, has induced me to write the following for the benefit of any amateur aquarian who, like myself, is not encumbered with a long purse.

I commenced my experiences as an aquarian about two years ago, using as a home for my stock of anemones a milkpail, a circular glass dish with sloping sides, twelve inches in diameter and four inches deep, to which, as my stock increased, I added three earthen pans. All these answered very well so far as the health of the live stock was concerned, but were open to two rather serious objections. 1st. The attention required by the four pans was much more than would have been necessary for one large tank; and 2nd, the weed, when it grew well, floated on the top of the water, and effectually hid the anemones from view. As it was only possible to see them from above—except through the sides of the milkpan, which, being thick and uneven, gave a very indistinct view—this was a great drawback, and I therefore began to consider what sort of a tank I could make to answer all my requirements. Just at this time I happened to see a handsome aquarium, purchased by a friend, the bottom, sides, and back of which were slate and the front plate-glass, and it occurred to me that if stout wood were substituted for the slate, and a good waterproofing material found to protect it, a very cheap and serviceable tank might be obtained.

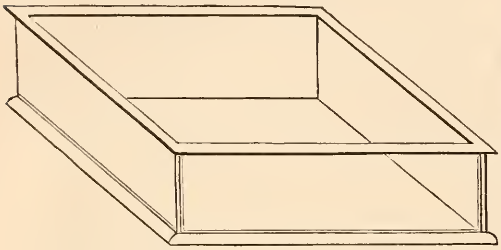


Fig. 155. Simple form of Marine Aquarium.

Having consulted a carpenter, and put the matter into his hands, he produced the tank represented by the accompanying sketch. The back and sides are of half-inch wood dovetailed together, to which the bottom, of rather thicker wood, is screwed. The inside is coated with pitch about the eighth of an inch thick, and the plate-glass front is put in with what is technically called "a rabbit and bead," hot pitch having been first run into the "rabbit," and the glass pressed well into it. A wide bead round the top protects the upper edge of the glass, and adds to the general appearance, and two coats of black paint and varnish made the whole presentable. This tank, which measures 19 in. × 17 in. × 9 in., can be made by any carpenter, and the cost of his labour and materials, pitch, plate-glass, &c., should not exceed 15s.

Before using the tank I seasoned it for a week with fresh water, and have since had it in use for three months with a family of thirty anemones of various sizes (the common smooth anemones and "daisies"), and half a dozen roots of ulva, enteromorpha, &c. No leakage has taken place since the first week, and the pitch has no injurious effect upon the water, which is perfectly clear and good.

Of course slate tanks are preferable for those who can afford them, as they keep the water at a more uniform temperature, but I find a judicious management of the window-blind sufficient to keep my tank in good working order.

J. R. Edwards.

THE COMMON OR VIVIPAROUS LIZARD.

(*Zootoca vivipara.*)

Perhaps one of the chief attractions offered by nature to the observant individual, is that which enables him to enter into the study of the habits of animals, to identify himself, as it were, with the joys or sufferings of some pet, and feel that that pet depends upon him for existence. With this understanding the following notes, carefully made, may interest a few in the little world of observers above hinted at.

During a mid-day ramble in May last, I was startled by some animal rushing suddenly into the grass at my feet. Feeling sure of some species of mouse, I gave chase, and soon succeeded in capturing a male specimen of the above lizard, which, although lame with one foot, was evidently endowed with no small amount of activity, for his tail and body underwent such a hearty wriggling, that one can hardly wonder that they sometimes part company. In the present instance, however, the creature seemed to decline parting with his tail, and has adhered to the resolution ever since, although we generally lift him up by it when exhibiting him to friends. His appearance was decidedly pleasing at first sight; a slender body with a snake-like head, eyes like black beads, set in orange-coloured rings, a tapering tail longer than the body, claws long and exquisitely delicate, and the brilliant tints on the throat, went to make up a form which struck me as being almost unique, and so I determined upon keeping him. No evil consequences prevented my lodging the prisoner in a deal box, 9 in. long by 6 in. broad, and 5 deep, placing a piece of glass loosely on the top, so as to allow freedom of air, and letting him run into a bundle of dry grass. These have been the arrangements for his lodging ever since, and answer admirably. I am aware of the advantage possessed by keepers of ferns and vivaria, and to any one who purposes keeping lizards, would recommend a good fern-case in preference to my wooden box. Plenty of water is generally a safe conclusion to come to where reptiles are concerned, and although the one under consideration does not often enter the water bodily, it is necessary to keep plenty within reach, as he *can* drink, a fact which some amateurs are liable to overlook.

The question of food puzzled me at the outset. The reptile would not eat flies, grubs, spiders, nor indeed anything. The excitement of the past few hours appeared to have affected him considerably, and very sulky he remained until the skin came off, for this it was that teased him, or at any rate helped to make him worse—he was casting his coat. This process is a very remarkable one; the old skin first splits across the back of the neck and sides, the whole of the back piece comes off intact, as also does the piece on the belly, that from the legs and tail is shed by degrees, bit by bit, and during the operation, which takes about twenty hours or so, as near as I have been able to judge, the reptile looks very dull and miserable, or "seedy" as some folks would term it. In the present instance, the back piece was so loose after a few hours that I pulled it gently off; by so doing, I believe, causing him no pain, and certainly hastening a process which, necessary though it be, appears to occasion considerable inconvenience for the time being. The skin from the belly came off soon afterwards, and the animal recovered its spirits and lively manners.

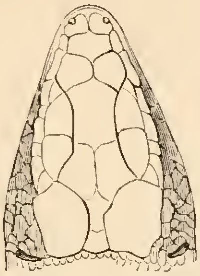


Fig. 156. Head of Common Lizard (*Zootoca vivipara*).

If the creature struck me with surprise at first, its appearance now was startling, for the old skin is comparatively dull for some days before casting; he seemed, especially on the belly and throat, as if bedecked with jewels. The back is an olive-green with dark bands down the middle and sides; the throat no colour at all, or rather, all colours at once, for a kind of sheen appears to play upon it like that of the dove; the belly is a brilliant orange with black spots, while the claws and tail generally are olive. The new skin is completely formed before the old one comes off. The latter, when shed, looks like "tissue-paper, with a lace pattern stamped on it," as some writer describes it. That from the tail comes off gradually ring by ring,—for the scales on the tail are arranged in an annular manner; but I think the last inch or inch and a half remains as before, and does not renew the skin. As regards the tail-casting, I know that the tail does come off, because I have seen specimens of this lizard with the new tail just apparent; but whether the action is purely voluntary or not I cannot say. Perhaps they change this appendage every year as a matter of course: observations would be very useful in clearing up this matter.

Before passing on to the question of food, it may be interesting to note the dates of each skin-casting above mentioned. The first took place on 17th May, and the second on the 22nd July; about nine weeks intervening. A writer in SCIENCE-GOSSIP for April, 1866, says of this lizard:—"The skin is changed about once in three weeks." I cannot explain the difficulty, but am convinced as to the correctness of my statement. My pet had now been two whole days without food or drink either, so far as I knew. On the third morning a bluebottle fly was held carelessly before his nose, and apparently without any signs of success. Suddenly, however, he stopped blinking his eyes, raised his head, arching the neck at the same time, took a knowing look, as much as to say "which is the most convenient method of grabbing him," and sprang upon the fly like a tiger. No doubt most of the readers of this paper have seen a terrier shake a rat, and from that a fair idea of the next part of the programme may be drawn. After a few gulps—not particularly pleasing to the eyes of "squeamish" people—the victim disappeared, and it was most ludicrous to see the manner in which our hero licked his jaws, looking round with an expression which said plainly enough, "excellent! any more?" After such a success, more was brought, and as eagerly and efficiently disposed of, in each case the programme being repeated. In spite of the romantic appearance which may strike some people, the foregoing description is not exaggerated in the least, and if only for the fun of feeding these creatures, they are really well worth keeping as pets. The peculiar flash of intelligence and eagerness, the arching of the neck, head drawn back, eyes fixed on the prey, the spring or strike with which he seizes it, and the rapid shake as if to stun the victim, are all repeated whenever the insect is larger than can be swallowed with a gulp. And then the science displayed in seizing the insect at the right instant and in the most convenient spot; the licking of the jaws, evidently showing approval and a desire for more; these things are well worthy of attention. Glowing accounts of the terrible python tell us how he makes his fearful meal; but it is a fair question whether the scene is really more awe-inspiring or disgusting (according to the opinion of the witness) where a rabbit is swallowed by a python than where a spider falls into the hands (or jaws) of our quiet-looking little *zootoca*. It is only the grand scale upon which the former does his work that makes us shudder at the one and smile at the other. To return—in a few minutes my pet had demolished three house-flies and a large spider, and such are now his regular diet. Of all the insects offered him, a spider appears to be the most acceptable: next to that a "frog-hopper," as the children term the little green insect found imbedded in a frothy mass upon various plants (*Aphrophora spumaria*).

Perhaps a couple of extracts from my note-book may show what he *can* do in the way of eating.

"June 29th.—He ate this morning two spiders (one very large), seven ordinary house-flies, and three 'forty-legs' (*Scolopendræ*).

July 8th.—Two house-flies, four *Scolopendræ*, and a 'blue-bottle' fly."

Judging from the above, we must allow that this lizard believes in feeding well. When gorged, he refuses the offered morsel, but often puts out his tongue and licks it. In SCIENCE-GOSSIP for Oct., 1873, a writer states, that after this licking the victim (a caterpillar) appeared quite insensible. I have never had cause to suspect that the tongue of this creature affects the vitality of an insect in the slightest.

Bees, earwigs, woodlice, beetles, and worms have been offered in vain: he will not touch them.

Lastly, the food must be alive, at least I never yet succeeded in persuading my pet to touch dead insects of any kind. When a fly, spider, &c., is held before him, he carefully eyes it, sometimes licks it, but never offers to strike unless the victim struggles. Many spiders feign death when caught, and I have tried several times to catch him eating one while quiet; in no case succeeding. The instant the spider moves, however, he attacks it, and so with other insects. Dead flies remain in the box until sun-dried, at times, when I know he is hungry. He will not eat meat,—*i.e.* butcher's meat—raw or cooked, nor vegetable food of any kind; and it appears clear that unless the game is of his own hunting and killing he despises it.

It was not until I had kept the animal several weeks that we caught him drinking. This he does by lapping the water like a cat. The tongue is like a ribbon, and bifurcate at the tip, and when drinking he darts the tips into the liquid, and rapidly withdraws it, curling it upwards at the same time. We have known him to go on lapping for two minutes without a pause, and in that time he can drink a good deal. His fondness for basking may be well seen by placing him upon a hot stone window-sill during the middle of the day; the body flattens out to twice its ordinary breadth, and fits close to the stone as if pressed thereon. Several times when so basking, I have noticed a profuse perspiration break out all over the body.

When disturbed, these reptiles move very rapidly with a wriggling motion, running and darting here and there until a stone or hole is found to shelter them; they make no noise, as far as I can ascertain, but dart the tongue rapidly in and out, puffing the neck at the same time. To these latter performances are perhaps due the tales as to their venomous or stinging propensities, which it is scarcely necessary to say *are* tales. One remarkable thing is the manner in which they can wriggle beneath a heavy stone. If one of these creatures be held in the hand, he naturally attempts to escape, and if squeezed he uses the head as a lever, pushing the sharp snout into a crevice and pushing forward and upwards with astonishing force. The flexibility of the body and back materially aid such movements, and the tail is also very useful in many ways. During sleep the tail is invariably coiled over the neck, like a prepared whiting, only not put in his mouth. In this position he looks remarkably like a young snake, an illusion favoured by the peculiar manner in which he raises his flat, snake-like head when disturbed.

Besides being able to run very fast, these creatures possess the power of jumping: twice have I seen my specimen jump from the top of his box, placed on the table, to the floor, a distance of four or five feet.

My specimen generally "puts in his appearance" from bed at about 10 a.m., takes two hours or so to get completely out of the grass, feeds and runs about until three or four o'clock, and gradually retires: in dull weather he stays in all day, and has been known to stay in for two days. I am here reminded, however, that although "patience is a virtue," we cannot expect too much of it in this degenerate age, so conclude by saying that if any lover of nature is in want of a pet, let him or her procure one of these graceful, bright-eyed little creatures, and there will be a greater store of real, honest pleasure in view than he can at once think of.

One thing, however, remains to be said about keeping pets. It is not by studying the habits of animals in captivity alone, however carefully it be done, that a true knowledge of them can be acquired; much may be done in this way, but many difficulties and sources of error exist; for whether we believe in "Natural Selection" or not, there can be little doubt that the habits of a creature in confinement become modified and altered by attendant circumstances. H. MARSHALL WARD.

ON COLLECTING AND PRESERVING OSTEOLOGICAL SPECIMENS.

IN Mr. Chivers's note on Preserving Animals, page 213 of SCIENCE-GOSSIP, the following passage occurs:—"The skeleton must be put in an airy place to dry, but not in the sun or near the fire, as that will turn the bones a bad colour." I cannot comprehend how this idea should have arisen. Perhaps the most indispensable assistant to the skeleton preparer is that very sun which Mr. Chivers warns him against. The bleaching power of the rays of a hot summer sun is astounding, and bones of the most inferior colour can rapidly be turned to a beautiful white by this means. It is for want of time and care in following out this method that the professional skeleton preparers in

London resort to the aid of lime, which, although it makes them white, is terribly detrimental to the bones themselves. In a smoky city like London, the principle of sun-bleaching would be hard to follow; but so great is its value that more than once I have had valuable specimens sent down to me in the country by a comparative anatomist in London to undergo a course of sun-bleaching; and a specimen which I have received stained and blotched, I have returned of a beautiful uniform white, a change entirely due to that sun which we are told to beware of.

The question, how are skeletons to be prepared? is one which is repeatedly asked in SCIENCE-GOSSIP. People desire a method by which with little trouble the flesh may be removed from a specimen, and a beautiful skeleton of ivory whiteness left standing in its natural position. I can assure all such inquirers that this cannot be accomplished by any method at all. The art of preparing bones is a long, elaborate, and difficult one, and he who wishes to become a proficient in it must be alike regardless to the most unpleasant odours, and to handling the most repulsive objects. Mr. Chivers's receipt for the maceration of specimens is about the best which one could have, only I should not advise so frequent a change of the water. What is needed is as rapid a decomposition of the flesh as is possible, and then the cleaning of the skeleton just before the harder ligaments have also dissolved. But this requires very careful watching, and with the utmost pains it is almost impossible to get a skeleton entirely connected by its own ligaments.

Another point which must be taken into consideration is this. What use is to be made of the specimens after they are prepared? Are they for purposes of real study, or simply as curious objects to look at? If the latter is the purpose, I must confess I do not think they are worth the trouble of preparing. If the former is the object for which they are intended, then I think no care or pains is thrown away. But for the real student of osteology the separated bones, as a rule, are far more valuable than those which are connected. He needs one or two set up for purposes of reference, but the great bulk of his specimens should be separate bones. Osteology is one of the most delightful branches of comparative anatomy, and one not very hard to master. Let any one try the experiment by getting together a few bones,—and those from the rabbit or the partridge we have had for dinner are by no means to be despised,—and then, by purchasing Flower's "Osteology of the Mammalia," which is a cheap and first-rate book, he will learn what the study of the skeleton really is. And then let him be on the look-out for specimens of all kinds on all occasions, bringing home all suitable objects he meets with in his walks, however unsavoury they may be, and he will be astonished to find how many specimens he will get together in the course of a year. I have now myself upwards of seventy skulls of various kinds, with often the rest of the skeleton as well, the greater part of which were gradually collected by keeping constantly on the watch for them, within a year and a half.

Osteology is so pleasant a pursuit that, if it was better known, it would have many devotees amongst those who wish to occupy their leisure time with natural science. If at any time I can be of any help to any one commencing the study, I shall always be glad to answer any inquiries addressed to me. EDWARD FENTONE ELWIN.

Caius College, Cambridge.

THE HISTORY OF THE LOBSTER.

WITHIN the last few weeks, Mr. S. I. Smith, of New Haven, U.S., has carefully described the various changes undergone by the native lobster. His paper further gives valuable information on the season of breeding, and other facts of practical interest. An abstract of this paper has appeared in the "Transactions of the Connecticut Academy," as well as an appendix to the report of the United States Fish Commissioner, lately issued. Mr. Smith shows that the lobster is dying out, from over-fishing, and in this opinion he is supported by other observers.

The season at which the female lobsters carry eggs varies much on different parts of the North American coast. Mr. Smith says that lobsters from New London and Stonington, Conn., carry eggs in April and May, whilst at Halifax he found them with eggs, in which the embryos were just beginning to develop, early in September. Dr. A. S. Packard, in the *American Naturalist* for July, states that he has seen them in Salem with the embryos ready to hatch in the middle of May, and he had been informed that the lobster also breeds there in November. He thinks it not impossible that they breed at intervals throughout the year. This is an important point, and the doctor further thinks that, at any rate, a close time ought to be kept on the coast of New England during April and May, and also during October and November, and that then persons should be fined for selling lobsters bearing eggs.

After figuring and describing the appearance of the lobster embryo in the eggs, Mr. Smith divides the larval condition of the lobster into three stages. The first (represented by figs. 158 and 160, one of the cephalo-thoracic legs of the second pair, enlarged twenty diameters; *a*, exopodus; *b*, epipodus; *c*, branchial appendages), is a little under the third of an inch in length, and was found early in July. In the second stage, the animal has increased in size, and rudimentary appendages have appeared upon the second to the fifth segments of the abdomen. In the third stage, the animal is about half an inch long, and has begun to lose its Mysis-like (*schizopodal*) appearance, and to assume some of the features of the adult.

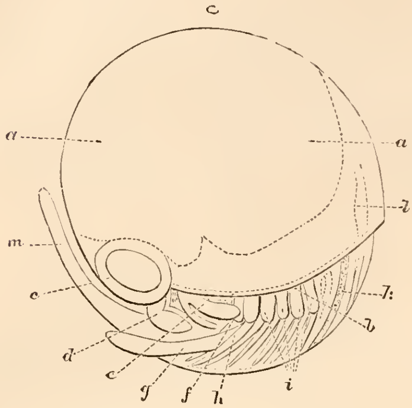


Fig. 157. Embryo of Lobster, × 20 dia. some time before hatching, removed from external envelope, and shown in a side view: *aa*, dark green yolk-mass still unabsorbed; *b*, lateral margin of the carapace marked with many dendritic spots of red pigment; *c*, eye; *d*, antennula; *e*, antenna; *f*, external maxilliped; *g*, great chcliped, which forms the big claw of the adult; *h*, outer swimming branch or exopodus of ditto; *i*, the four ambulatory legs with their exopodal branches; *k*, intestine; *l*, heart; *m*, bilobed tail, seen edgewise.

There are probably two succeeding stages before the adult form is attained. One is described by Mr. Smith, while the first of the two he supposes to have existed, but has not discovered. After this, the animal ceases to swim on the surface, and later

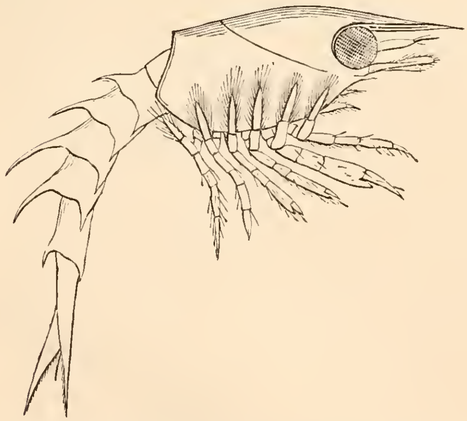


Fig. 158. First larval or mysis stage of the Lobster, enlarged in length from $\frac{1}{3}$ an inch.

in the summer it seeks the bottom of the sea. It feeds on the young of various animals, the larvæ of other crustacea, and when much crowded in captivity, on its own kind. In the first stage of the adult form, when the animal is about three-fifths of an inch in length, it still differs from the adult so much that it would be regarded as a different genus! "In this stage, the young lobsters swim very

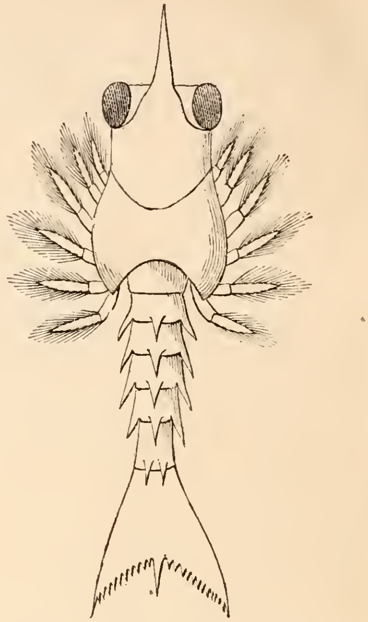


Fig. 159. Back view of ditto (enlarged as before).

rapidly by means of the abdominal legs, and dart backwards when disturbed with the caudal appendages, frequently jumping out of the water in this

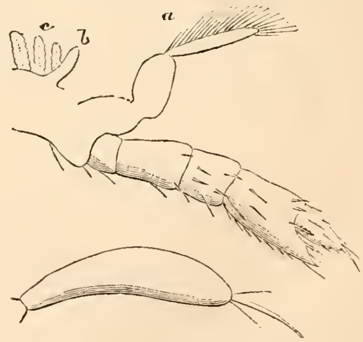


Fig. 160. Cephalo-thoracic leg of the second pair, × 20 dia. *a*, exopodus; *b*, epipodus; *c*, branchial appendages.

way like shrimps, which their movements in the water much resemble. They appear to live a large part of the time at the surface, as in the earlier stages, and were often seen swimming about among other surface animals." Mr. Smith thinks the young pass through all the stages he describes in the course of a single season. Those in the last stage mentioned he believes had not been hatched from the eggs more than six weeks, and very likely a shorter time. How long the young retain their free swimming habits after arriving at the lobster-like form was not ascertained. Specimens three inches long have acquired nearly all the characters of the adult. "Of all the larval stages of other genera of crustacea, there are none which are closely allied to the early stages of the lobster. According to Rathke, *Astacus* leaves the egg in a form closely resembling the adult, the cephalo-thoracic legs having no exopodal branches, and the abdominal legs being already developed. Of the earlier stages of the numerous other genera of *Astacidea* and *Thalassinidea* scarcely anything is known; but as far as is known, none of them appear to approach the larvæ of the lobster. Most of the species of *Crangonidæ* and *Palæmonidæ* (among the most typical of Macrourans) of which the development is known, are hatched from the egg in the *zoëa* stage, in which the five posterior pairs of cephalo-thoracic appendages, or decapodal legs, are wholly wanting, as are also the abdominal legs, while the two anterior pairs of maxillipeds, or all of them, are developed into locomotive organs. In no period of their development do they have all the decapodal legs furnished with natatory exopodal branches. They are undoubtedly larval forms closely allied to those of *Homarus* in some of the groups of the Macrourans, although they appear to be as yet unknown.

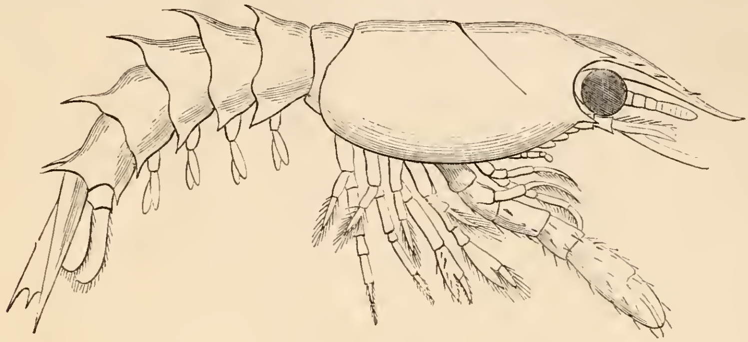


Fig. 161. Third larval stage of Lobster (nat. size ½ in. long).

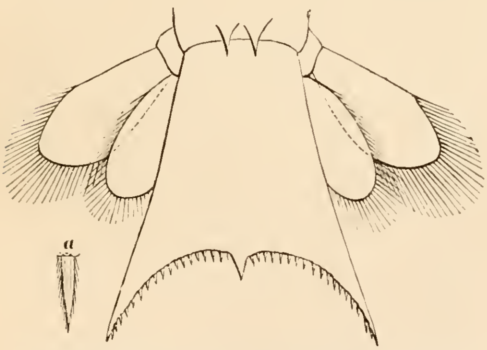


Fig. 162. Terminal portion of abdomen of ditto, × 15 dia.: *a*, one of the spines of the posterior margin of terminal segments, × 75.

"Notwithstanding these larval forms of the lobster seem to have no close affinities with the known larvæ of other genera of Macrourans, they do show in many characters a very remarkable and interesting approach to the adult *Schizopoda*, particularly to the *Mysidæ*. This seems to furnish additional evidence that the Schizopods are only degraded Macrourans, much more closely allied to the *Sergestidæ* than to the *Squilloidea*."

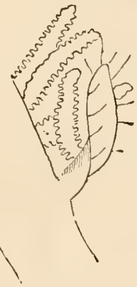


Fig. 163. Basal portion of one of the cephalo-thoracic legs of second pair, showing epipodus and branchial appendages × 20 dia.

Mr. W. H. Silsbee thinks the lobster only moults once a year, after having nearly attained its maturity, at some period between May and November. The length of the animal observed, before moulting, was six and a half inches; immediately after it was seven and a quarter,—a *sudden* increase of three-quarters of an inch.

"He would be a bold man who would venture to predict where science will be fifty years hence!"—*Huxley*.

THE CARNIVOROUS HABITS OF CERTAIN PLANTS.

DR. HOOKER, President of the Royal Society, at the meeting of the British Association at Belfast, whilst acting as President of the Department of Anatomy and Physiology, gave a most interesting and important address on the above subject, of which the following is a copious abstract. He said that various observers have described with more or less accuracy the habits of such vegetable sportsmen as the Sun-dew, the Venus' Fly-trap, and the Pitcher-plants, but few have inquired into their motives; and the views of those who have most accurately appreciated these have not met with that general acceptance which they deserved. Quite recently the subject has acquired a new interest, from the researches of Mr. Darwin into the phenomena which accompany the placing albuminous substances on the leaves of Drosera and Pinguicula, and which in the opinion of a very eminent physiologist, prove, in the case of Dionæa, this plant digests exactly the same substance, and in exactly the same way, that the human stomach does. With these researches Mr. Darwin is still actively engaged, and it has been with the view of rendering him such aid as my position and opportunities at Kew afforded me, that I have, under his instructions, examined some other carnivorous plants. In the course of my inquiries I have been led to look into the early history of the whole subject, which I find to be so little known and so interesting that I have thought that a sketch of it, up to the date of Mr. Darwin's investigation, might prove acceptable to the members of this Association. About 1768, Ellis, a well-known English naturalist, sent to Linnæus a drawing of a plant, to which he gave the poetical name of Dionæa. I will read the account which he gave of it to Linnæus, and which moved the great naturalist to declare that, though he had seen and examined no small number of plants, he had never met with so wonderful a phenomenon:—"The plant . . . shows that Nature may have some views towards its nourishment in forming the upper joint of its leaf like a machine to catch food; upon the middle of this lies the bait for the unhappy insect that becomes its prey. Many minute red glands that cover its surface, and which perhaps discharge sweet liquor, tempt the poor animal to taste them; and the instant these tender parts are irritated by its feet, the two lobes rise up, grasp it fast, lock the rows of spines together, and squeeze it to death. And further, lest the strong efforts for life in the creature just taken should serve to disengage it, three small erect spines are fixed near the middle of each lobe, among the glands, that effectually put an end to all its struggles. Nor do the lobes ever open again while the dead animal continues there. But it is, nevertheless, certain that the plant cannot distinguish an animal from a vegetable or mineral substance; for if we introduce a straw or pin between the lobes, it will grasp it full as fast as if it was an insect." Linnæus, however, only saw in these wonderful actions extreme sensitiveness in the leaves, and did not accept Ellis's account of the *coup de grâce* which the insects received from the three stiff hairs in the centre of each lobe of the leaf. For about a century the history of the plant was very little advanced. Sixty years after Linnæus wrote, Dr. Curtis, of Wilmington, North Carolina, published the following accurate scientific observations:—"Each half of the leaf is a little concave on the inner side, where are placed three delicate hair-like organs, in such an order that an insect can hardly traverse it without interfering with one of them, when the two sides suddenly collapse and inclose the prey with a force surpassing an insect's efforts to escape. The fringe of hairs of the opposite sides of a leaf interlace, like the fingers of two hands clasped together. The sensitiveness resides only in these hair-like processes on the inside, as the leaf may be touched or pressed in any other part without sensible effects." To Ellis belongs the credit of divining the purpose of the capture of insects by the Dionæa; but Curtis made out the details of the mechanism. For another generation the history of this plant stood still; but in 1868 an American botanist, Mr. Canby, while staying in the Dionæa district, studied the habits of the plant pretty carefully, especially the points which Dr. Curtis had made out. His first idea was that "the leaf had the power of dissolving animal matter, which was then allowed to flow along the somewhat trough-like petiole to the root, thus furnishing the plant with highly nitrogenous food." By feeding the leaves with small pieces of beef, he found, however, that these were completely dissolved and absorbed; the leaf opening again with a dry surface, and ready for another meal, though with an appetite somewhat jaded. He found that cheese disagreed horribly with the leaves, turning them black, and finally killing them. Finally, he details the useless struggles of Curculio to escape, as thoroughly establishing the fact that the fluid already mentioned is actually secreted, and is not the result of the decomposition of the substance which the leaf has seized. This Curculio, being of a resolute nature, attempted to eat his way out. When discovered, he was still alive, and had made a small hole through the side of the leaf, but was evidently becoming very weak. On opening the leaf, the fluid was found in considerable quantity around him, and was without doubt gradually overcoming him. The leaf being again allowed to close upon him, he soon died.

Dr. Hooker then described the character of the communication on this plant made at the last meeting of the Association by Dr. Burdon Sanderson. All students of the vegetable side of organized nature were astonished to hear that certain experiments which Dr. Sanderson, at the instigation of Mr. Darwin, had made, proved to demonstration that when a leaf of Dionæa contracts, the effects produced are precisely similar to those which occur when muscle contracts. Not merely are the phenomena of digestion in this wonderful plant like those of animals, but the phenomena of contractility agree with those of animals also. Not confined to a single district in the New World, but distributed over the temperate parts of both hemispheres, in sandy and marshy places, are the curious plants called Sun-dews—the species of the genus *Drosera*. They are now known to be near congeners of Dionæa; a fact which was little more than guessed at when their curious habits were first discovered.

The President proceeded to trace at much length the interesting history of the Sun-dew. It is to Mr. Darwin we are indebted for the latest and most important additions to the facts established by the earliest observers. Subsequent botanists had boldly asserted that the early accounts given of the Sun-dew were not true. The repeated testimony of various observers, with respect to Dionæa and Drosera spreads over a century, and though at no time warmly received, must, I think, satisfy you that in this small family of the *Droseraceæ* we have plants which, in the first place, capture animals for purposes of food; and, in the second, digest and dissolve them by means of a fluid which is poured out for the purpose; and, thirdly, absorb the solution of animal matter which is so produced. Before the investigations of Mr. Darwin had led other persons to work at the subject, the meaning of the phenomena was very little appreciated. Only a few years ago, Duchartre, a French physiological botanist, after mentioning the views of Ellis and Curtis with respect to Dionæa, expressed his opinion that the idea that its leaves absorbed dissolved animal substances was too evidently in disagreement with our knowledge of the function of leaves, and the whole course of vegetable nutrition, to deserve being seriously discussed. Perhaps if the *Droseraceæ* were an isolated case of a group of plants exhibiting propensities of this kind, there might be some reason for such a criticism. But we have now reason to believe that there are many instances of these carnivorous habits in different parts of the vegetable kingdom, and among plants which have nothing else in common but this. As another illustration I shall take the very curious group of Pitcher-plants, which is peculiar to the New World. The genus *Sarracenia* consists of eight species, all similar in habit, and all natives of the Eastern States of North America, where they are found more especially in bogs, and even in places covered with shallow water. Their leaves, which give them a character entirely their own, are pitcher-shaped and trumpet-like, and are collected in tufts springing immediately from the ground; and they send up at the flowering season one or more slender stems, bearing each a solitary flower. This has a singular aspect, due, to a great extent, to the umbrella-like expansion in which the style terminates; the shape of this, or perhaps of the whole flower, caused the first English settlers to give to the plant the name of Side-saddle Flower. The first fact which was observed about the Pitchers was that when they grew they contained water.

The description of the various species, and their history, was then given by Dr. Hooker, and was very long and exhaustive. In 1829, Burnett wrote a paper containing a good many original ideas, expressed in a somewhat quaint fashion, in which he very strongly insisted on the existence of a true digestive process in the case of *Sarracenia*, analogous to that which takes place in the stomach of an animal. Our knowledge of the power of *Sarracenia variolaris* is now pretty complete, owing to the observations of two South Carolina physicians. One, Dr. M'Bride, made his observations half a century ago, but they had, till quite recently, completely fallen into oblivion. He devoted himself to the task of ascertaining why it was that *Sarracenia variolaris* was visited by flies, and how it was that it captured them. Dr. Mellichamp, who is now resident in the district in which Dr. M'Bride made his observations, has added a good many particulars to our knowledge. It is evident that there are two very different types of pitcher in *Sarracenia*, and an examination of the species shows that there must probably be three. These may be primarily classified into those with the mouth open and lid erect, and which consequently receive the rainwater in more or less abundance; and those with the mouth closed by the lid, into which rain can hardly, if at all, find ingress. I cannot take leave of *Sarracenia* without a short notice of its near ally, *Darlingtonia*, a still more wonderful plant, an outlier of *Sarracenia* in geographical distribution, being found at an elevation of five thousand feet on the Sierra Nevada of California, far west of any locality inhabited by *Sarracenia*. It has pitchers of two forms; one, peculiar to the infant state of the plant, consists of narrow, somewhat twisted, trumpet-shaped tubes, with very oblique open mouths, the dorsal lip of which is drawn out into a long, slender arching, scarlet hood, that hardly closes the mouth. The slight twist in the tube causes these mouths to point in various directions, and they entrap very small insects only. Before arriving at a state of maturity the plant bears much larger, suberect pitchers, also twisted, with the tip produced into a large inflated hood, that completely arches over a very small entrance to the cavity of the pitcher. A singular orange-red, flabby, two-lobed organ hangs from the end of the hood, right in front of the entrance, which, as I was informed lately by letter from Professor Asa Gray, is smeared with honey on its inner surface. These pitchers are crammed with large insects, especially moths, which decompose in them, and result in a putrid mass. I have no information of water being found in its pitchers in its native country, but have myself found a slight acid secretion in the young states of both forms of pitcher. I cannot dismiss *Darlingtonia* without pointing out to you what appears to me a most curious point in its history, which is, that the change from the slender, tubular, open mouths, to the inflated close-mouthed pitchers, is absolutely sudden in the individual plant. I find no pitchers in an intermediate stage of development. This, a matter of no little significance in itself, derives additional interest from the fact that the young pitchers to a certain degree represent those of the *Sarracenias*, with open mouths and erect lids, and the old pitchers those of the *Sarracenias* with closed mouths and globose lids. The combination of representative characters in an outlying species of a small order, cannot but be regarded as a marvellously significant fact in the view of those morphologists who hold the doctrine of evolution. . . . . In what I have said, I have described the most striking instances of plants, which seem to invert the order of Nature, and draw their nutriment—in part at least—from the animal kingdom, which is often held to be the function of the vegetable kingdom to sustain. I might have added some additional cases to those I have dwelt upon. Probably, too, there are others still unknown to science, or whose habits have not yet been detected. But the problem that forces itself upon our attention is, how does it come to pass that these singular aberrations from the otherwise uniform order of vegetable nutrition, make their appearance in remote parts of the vegetable kingdom :—why are they not more frequent, and how were such extraordinary habits brought about, or contracted ? At first sight the perplexity is not diminished by considering the nature of ordinary vegetable nutrition. The roots take up certain matters from the soil. Nitrogen forms nearly four-fifths of the air we breathe, yet plants can possess themselves of none of it in the free uncombined state. They withdraw, in minute quantities from the ground, nitrates and salts of ammonia, and from these they build up with starch, or some analogous material, albuminoids or protein compounds, necessary for the sustentation and growth of protoplasm. At first sight, nothing can be more unlike this than a *Dionæa* or a *Nepenthes* capturing insects, pouring out a digestive fluid upon them, and absorbing the albuminoids of the animal, in a form probably directly capable of appropriation for their own nutrition. Yet there is something not altogether wanting in analogy in the case of the most regularly constituted plants. The seed of the castor-oil plant contains, besides the embryo seedling, a mass of cellular tissue or endosperm filled with highly nutritive substances. The seedling lies between masses of these, and is in contact with it—and as the warmth and moisture of germination set up changes which bring about the liquefaction of the contents of the endosperm, and the embryo absorbs them, grows in so doing, and at last having taken up all it can from the exhausted endosperm, develops chlorophyll in its cotyledons under the influence of light and relies on its own resources. A large number of plants, then in their young condition, borrow their nutritive compounds ready prepared, and this is in effect what carnivorous plants do later in life. The absolute difference between plants which absorb and nourish themselves by the products of the decomposition of plant structures, and those which make a similar use of animal structures is not very great. We may imagine that plants accidentally permitted the accumulation of insects in some parts of their structure, and the practice became developed because it was found to be useful. It was long ago suggested that the receptacle formed by the connate leaves of *Dipsacus* might be an incipient organ of this kind ; and though no insectivorous habit has ever been brought home to that plant, the theory is not improbable. Linnæus, and more lately Baillon, have shown how a pitcher of *Sarracenia* may be regarded as a modification of a leaf of the *Nymphæa* type. We may imagine such a leaf first becoming hollow, and allowing *débris* of different kinds to accumulate ; these would decompose, and a solution would be produced, some of the constituents of which would diffuse themselves into the subjacent plant tissues. This is in point of fact absorption, and we may suppose that in the first instance—as perhaps still in *Sarracenia purpurea*—the matter absorbed was merely the saline nutritive products of decomposition, such as ammoniacal salts. The act of digestion—that process by which soluble food is reduced without decomposition to a soluble form fitted for absorption—was doubtless subsequently required. The secretion, however, of fluids by plants, is not an unusual phenomenon. In many Aroids a small gland at the apex of the leaves secretes fluid, often in considerable quantities, and the pitcher of *Nepenthes* is only a gland of this kind, enormously developed. May not, therefore, the wonderful pitchers and carnivorous habit of *Nepenthes* have both originated by natural selection out of one such honey-secreting gland as we still find developed near that part of the pitcher which represents the tip of the leaf ? We may suppose insects to have been entangled in the viscid secretion of such a gland, and to have perished there, being acted upon by those acid secretions that abound in these and most other plants. The subsequent differentiation of the secreting organs of the pitcher into aqueous, saccharine, and acid, would follow *pari passu* with the evolution of the pitcher itself, according to those mysterious laws which result in the correlation of organs and functions throughout the kingdom of Nature; and which, in my appprehension, transcend in wonder and interest those of evolution and the origin of species. These remarks will, I hope, lead you to see that though the processes of plant nutrition are, in general, extremely different from those of animals, and involve very simple compounds, yet that the protoplasm of plants is not absolutely prohibited from availing itself of food, such as that by which the protoplasm of animals is nourished, under which point of view these phenomena of carnivorous plants will find their place, as one more link in the continuity of nature.

MICROSCOPY.

Exuviæ of Insects.—Some very interesting and instructive objects for the microscope, and which, moreover, are easily procured, and also easily mounted, consist of the exuviæ or cast skins of many species of insects. These may be found in a variety of places; generally on the under side of leaves of plants, or some such protected spot, to which they are attached by their feet, or rather their old shoes, and from which they can be removed with a little care. I find that a good way to mount these exuviæ is dry, in a cell sufficiently deep to allow of their retaining their natural position. Do not use a black background, but view with transmitted light. They show well with spot lens and binocular arrangement. The above will not apply to the larvæ of lepidoptera, as they leave their "old clothes" in a small dried heap, which they often devour.—*E. Lovett.*

Möller's New Diatomaceen Typen Platte.—I have inspected some of these "Platten," and found that the objects are mounted in a glass cell, set on a glass slide of the usual dimensions, three inches by one inch (the same as the other Typen Platten); and for this reason I believe that Mr. F. Kitton's description of the same (Science-Gossip, August, 1874, page 176) is somewhat incorrect when he states: "The objects are mounted between two pieces of thin glass; these are afterwards set in a brass plate . . ." Mr. Baker has supplied me with a *safety* brass plate for my Möller's Typen Platte No. 1, which has the same dimensions as those given by Mr. Kitton. Perhaps the *new* Typen Platte described by Mr. Kitton was inclosed in a similar *safety* brass plate, and this was taken as forming part of the "Platte." Mr. K.'s description is quite accurate in every other respect, and I only make the above observations in order to prevent disappointment to intending purchasers of these "marvellous specimens" when finding that the objects are set on an ordinary glass plate, instead of a brass one, as some of Mr. Norbert's Bands of Test Lines. I may just add that my *new* Typen Platte contains 100 diatoms (showing front and side-views, &c.), and that thirteen species of these are not included among those of my Typen Platte No. 1. I am not aware that Herr Möller supplies the *new* Typen Platte with 80 and 100 specimens, as mentioned by Mr. Slack (*Monthly Microscopical Journal*, No. 62, July 1874, pages 44 and 45). I believe the 100-specimens *new* Diatomaceen Typen Platte *is the only one of this kind* produced at present by Möller. While on this subject I would suggest that Möller's Typen Platten of *Echinoidea* and *Holothuridæ*, also mentioned by Mr. Slack as above, are well worth a description, and it is to be hoped that Mr. Kitton, Mr. Slack, or any other eminent microscopist, will undertake the task. Herr Möller has sent to the market a great variety of preparations well deserving the attention of microscopists, especially some new and beautiful sections of hard substances—bones, teeth, shells, spines of *Echinoidea*, minerals, &c., and, though last not least, a new *Probe Platte*, dry, a truly valuable test slide. The other preparations of his, such as sections of wood, selected and arranged diatomaceæ, &c., are already well known.—*A. de Souza Guimaraens.*

Fixing Arranged Diatoms.—At page 110 of Science-Gossip for 1873, in answer to an inquiry from C. L. Jackson, page 69 of the same year, I explained the method of fixing arranged diatoms, which has been adopted by Mr. J. K. Jackson in his article at page 203 of the current year. My object in writing now is to caution the readers of Science-Gossip not to delay the fixing process until all the diatoms are arranged, but to secure each one by the breathing process directly it is placed in position (as I suggested to Mr. C. L. Jackson in the article above mentioned), and thus avoid the annoyance of having an hour's work spoiled by the slamming of a door, or by an accidental swerve of the arranging tool. It should also be noted that when a diatom is taken from a drop of water and placed on the gummed surface, being moist, it immediately adheres thereto, and any attempt to move it results in its utter destruction, unless the gum has previously been thoroughly softened by the breathing process. With regard to the implement, a simple hair is not well adapted for withdrawing a diatom from a drop of water. The orthodox weapon is a very fine bristle split at the end in such a manner that when pressed on a slide the cleft portion opens like the nibs of a pen, and may then be allowed to close upon the chosen diatom by its own elasticity. By reversing the process the diatom thus taken from the store slide may be deposited in a minute drop of water, placed on the gummed cover, near the spot where the group is to be arranged. It may then be coaxed into position by means of the single hair. The usual hunting-ground for these split bristles is an old shaving-brush, and the microscopist should not rest saitsfied until he has found one with which he can work comfortably.—*F. W. M.*

ZOOLOGY.

The Canterbury Tick (*Argas reflexus*).—To the question put by W. W. Spicer, on page 185, as to whether the representation of the claws with the foot in fig. 86 is quite correct, I must answer, they are not correct; and how I could be guilty of such an oversight, puzzles me. Until he drew my attention to it (for which I thank him) I had not noticed it. On referring to the sketch of the young *Argas* (fig. 83), it will be seen that five out of six of the claws are placed in their proper position. Those

Fig. 164. Foot and claws of *Argas reflxus* (highly magnified).

sketches were taken from dead specimens that I had mounted. The annexed drawing of the foot and claw is from a living specimen which will rectify the mistake I had inadvertently fallen into in fig. 86. I have only three specimens living, and on August 22nd I observed that one of them had laid about 40 eggs. As I expect in about six or eight weeks they will be hatched, I should feel obliged if any of the readers of Science-Gossip would furnish me with some plan to preserve them alive, as their further development would be interesting to witness.—*James Fullagar, Canterbury.*

Tetranychus Lapidum (*Stone Mite*).—I have found the ova of this insect plentifully this summer on large flint pebbles. Never having met with the object before, I doubted as to its nature, for on examining it through a lens, it has very much the appearance of a minute fungus, dispersed in groups within the shelter of the shallow sulci of the flint. Each organism measures about the $\frac{1}{150}$ inch in diameter. I submitted specimens to Dr. Cooke, who very soon resolved my doubts, referring me to Science-Gossip, vol. iii. p. 126, figs. 93, 94, where I find the insect and its eggs very accurately delineated, with references to other works which I have not the opportunity of making use of. It is an interesting microscopical object under a low power, and when submitted to × 300, displays an infinite number of molecules having a vibratory motion. I do not know the nature of these minute bodies, but if they are embryonic germs, the ovum must be wonderfully prolific.—*W. Smart.*

New Species of European Lizard.—Dr. A. Günther has recently described a new species of Lizard from a collection of reptiles made by Lord Lilford during a cruise in the Mediterranean. He has named it after its discoverer, *Zootoca Lilfordi.* The upper parts of this lizard are of a deep shiny black, and the lower of a beautiful sapphire-blue. The largest specimen was five and three quarter inches in length, of which the tail measured three inches and a quarter. Lord Lilford found this species inhabiting a very small island on the south-east of Minorca, in considerable numbers; and Dr. Günther now refers the lizard so common on the Tilfola Rock, south of Malta, to the same species.

Etymology of Aphis.—The recent references to this family of insects suggests a question of some interest, and which has been found to be attended with no small amount of difficulty, to prove whence is the word Aphis derived? As it is not found in the Greek lexicons or Latin dictionaries, it was probably unknown to the ancients, and the presumption is that it was coined by Linnæus. Assuming that he formed the word correctly, I believe that he derived Aphis (*i.e.* Aphid, as the plural shows) from the Greek *a* privative and *pheidomai* (φείδομαι), "to spare," and that he meant to describe these creatures as unsparing in their destructiveness. The correctness of this derivation I am prepared to substantiate, if called upon to do so, on philological as well as other grounds. On the other hand, it would not be difficult to show the untenableness of all the other proposed etymologies with which I am acquainted: *e.g.*, from *aphiemi* (ἀφίημι), to emit, with reference to the honey-dews exuded by the insect; from *haptomai* (ἅπτομαι), to touch, with reference to its crowding together in masses; from *aphusso* (ἀφύσσω), to draw out, with reference to its habit of sucking the juices of plants; from *a* and *phus* (φύς, 2nd aor. part. of φύω), with reference to its parthenogenesis. It would, however, greatly help to a solution of the question if we could know in what light principally Linnæus himself viewed these creatures. Can any of the readers of SCIENCE-GOSSIP produce a passage or passages from the writings or history of the great naturalist which will throw light on this question?—*B. P. P., Haslemere, Surrey.*

BOTANY.

SOLANUM GRANDIFLORUM OR DENTATUM.—Attention has been drawn to a shrub growing over the ten-foot garden wall of the late Rev. — Rooper, towards the road on the lower part of Furze Hill, Brighton, bearing a sort of umbels of large elegant violet-coloured flowers, resembling the common blue-flowered potato, on which account it has received the general name of the potato-tree: the flower-heads are like those figured in Loudon's Encyclopædia of Plants as *Solanum giganteum* and *S. jasminoides*, the latter being in the second additional supplement. At first I took it for *Solanum giganteum*, but on examination found no prickles on the stem; I then thought it might be *Solanum jasminoides*, but its leaves are all *simple*. On applying to Mr. Smythe, of Centurion-road Nursery, Brighton, who lived ten years as gardener to Mr. Rooper, he informed me that Mr. Rooper called it *Solanum grandiflorum*, but that it was at one time called *S. dentatum*, its lower leaves being slightly insinuato-dentate; I do not find any plant of either name in Loudon's Encyclopædia, although upwards of seventy species of Solanum are there enumerated. Perhaps some of your readers can give information regarding its native country, and date of introduction, and if it is correctly named, or known by any other name; also if it has been described in any and what publication, and whether it has been figured. The leaves are all *simple*, oblongo-lanceolate acute; the flower-heads are large and very abundant; the shrub is upwards of ten feet high, bearing numerous bunches of flowers, some of them with more than twenty flowers, the branches being twice forked; the berry dark purple when ripe in November; the corolla is rather larger than the common potato, and the yellow anthers very prominent; leaves and stem *all smooth*. The plant was cut down last autumn, but is now more than ten feet high, with young branches, grown since the spring, upwards of six feet in length; it has been in flower since May, and will continue to flower apparently till September or October. Both Mr. Balchin, of Clifton-ville Nursery, and Mr. Smythe are cultivating it from cuttings; it is almost (indeed quite in a mild winter) an evergreen. Mr. Balchin tells me that when he first took the ground at Clifton-ville, which now forms his nursery, a tree was growing there which he believes was the same as that which is growing in Mr. Rooper's garden, but which, unfortunately, he was obliged to destroy, and omitted to take cuttings and propagate it, not knowing its value. Mr. Rooper was a botanist, who prided himself in cultivating rare plants, and although, since his death, the garden has been neglected, while the property was for sale, there are still to be found some other interesting and rare plants, particularly the *Viburnum plicatum*, an evergreen noticed in the second supplemental list of Loudon's Encyclopædia. Mr. Smythe says there was, and he thinks still is, in the garden an *Azalea grandiflora*, with large beautiful flowers; it is not enumerated in Loudon's last edition of 1855.—*T. B. W., Brighton.*

FLORA OF DORSETSHIRE.—A handsome volume of 300 pp., bearing the above title, has just been issued by Whitaker & Co., Ave-Maria-lane. The author is Mr. J. C. Mansel-Pleydell, F.L.S., &c. We regard this as one of the most copious and best compiled floras we have seen for a long time. Mr. Pleydell has grouped the county of Dorset into seven districts, and very wisely made his list of the order of plants agree with those of the "London Catalogue." The pre-Linnean names follow those now attached to species, and the synonyms come after. The geographical distribution of each species is also given, as well as the conditions under which it grows. One valuable feature in this Flora is the reference to the extension of any plant into the four counties adjacent to Dorset, and to Normandy, across the Channel. A map, coloured for the seven districts, precedes the text, and there are several trustworthy essays on the Geology, Physical Geography, Meteorology, &c., of the district.

THE BUTTERWORT A CARNIVOROUS PLANT.—Mr. Charles Darwin has recently communicated to the Royal Horticultural Society some experiments on *Pinguicula vulgaris*, which prove that its leaves show a tendency to assimilate animal matter, like those of the Sundews, Sarracenias, &c. On the application of meat, the edges of the leaves curled inwards, and a slightly acid secretion was given off from them. One singular feature of the experiments was that the margin of the leaf unfolded itself about twenty-four hours after the application of the substances, whether these were taken away or permitted to remain.

SENEBIERA DIDYMA.—This plant has occurred so abundantly this summer, both here and at Bosham in several places, that its appearance seems worth notice, as not many stations for it on this part of the coast have hitherto been given. I have not Watson by me, but am informed that he records it in West Sussex, on the authority of Salmon's MSS., yet not further eastward than Brighton. Probably it will be found to occur in more stations on the south coast than have been noted. While the pods of *S. didyma* differ so much from those of

S. coronopus as to distinguish the species at first sight, the extremely powerful, pungent odour of *S. didyma*—a point not mentioned by some of our best botanists—at once gives information of it to the olfactory organs.—*F. H. Arnold, LL.B., Fishbourne.*

Cichorium Intybus.—Chicory, or wild succory, is very common on the Oolites, both in Gloucestershire and Dorsetshire, and its striking blue flowers are always attractive. We know that most plants with blue flowers have a tendency to produce white ones, but we never saw any white-flowered chicory before to-day, when our children brought in a quantity from the village.—*J. B., Bradford Abbas.*

Valeriana Phu.—I am greatly obliged to "J.F.R." for identifying this plant. As regards its popular or provincial name "Sidwell" (*qy. Seedwell*), I am quite sure that this name is applied to this plant, and not to the *Valeriana officinalis*, which is very well known here, from the fact of its growing plentifully in Cranborne Chase woods, from whence the country druggists were formerly supplied by the neighbouring peasantry with the root, and may be still, for aught I know. The "Sidwell" is not a common garden plant; I know of only two in the cottage gardens here, the leaves of which are in great repute with the doctoresses as a healing application to wounds and sores.—*W. Smart, Cranborne.*

Pollen-Grains and the Fertilization of Flowers.—This was the subject of a very interesting paper read at the meeting of the British Association in Belfast, by Mr. A. W. Bennett. The author dealt with the form of pollen-grains in relation to the fertilization of flowers. He said that although, not unfrequetnly, a common form of pollen-grain runs through a whole group of plants, yet more often the form is found to be adapted to the requirements of the species, and varies even within a small circle of affinity. In those plants which are fertilized by the agency of insects there are three general modes in which the form of the grain is adapted for the purpose. We have firstly —and this is by far the most common form—an elliptical grain, with three or more longitudinal furrows, as in *Ranunculus ficaria, Aucuba japonica,* and *Bryonia dioica*: secondly, spirical and elliptical, and covered with spines, as in many composite malvæ; and thirdly, where they are attached together by threads or viscid excretion, as in *Richardia æthiopica*. In those plants, on the contrary, which are fertilized by the agency of the wind, as most grasses, the hazel, and *Populus balsamifera*, the pollen is uniformly perfectly spiral and unfurnished with any furrows, and is generally moreover very light and dry. The genus *Viola* supplies two very markedly different, in which the quoins have the ordinary elliptical three-furrowed form, and where every point of the structure of the style and stigma is favourable to fertilization by bees. In all Crucifers known the pollen has the most common form. In the cowslip and primrose there is uniform difference in size between the pollen belonging to the two forms, that of the short-styled being considerably larger than that of the long-styled form.

Parthenogenesis in Ferns.—Dr. Farlow, of Harvard University, has recently read a paper on "An Asexual Growth from the Prothallus of *Pteris serrulata*"—an Indian fern. As is well known, a fern comes to fructification and produces spores without any fertilization. The spores, in germinating, produce a liverwort-like frond, the prothallus, on which the two kinds of sexual organs are developed. The fertilization of a cell in the one by a spermatozoid from the other results in the development and growth of the former into a bud, and so into a fern. Dr. Farlow discovered, in a sowing of the spores of the *Pteris serrulata*, prothalli which were developing young ferns from their substance quite apart from any archegonium, starting in a different way by a direct outgrowth from the prothallus, beginning with a scalariform duct, but producing plantlets thus far undistinguishable from those which arise from an archegonium through fertilization. Dr. Farlow, confining himself strictly to the facts of the case and their direct interpretation, does not use the word "parthenogenesis." But Dr. Asa Gray thinks the case substantially analogous to that of *Parthenogenesis* in flowering plants. He says that if it be demurred that the case is one of bud-growth, and therefore not of the nature of parthenogenesis proper, the reply is that it comes from a parthenogenetic spore, which here develops plants without the sexual fertilization of that class of plants. If the facts hold good, the conclusion is that sexual fertilization, however necessary, is not absolutely necessary in every generation of plants; somewhat as cross-fertilization, however necessary in the long run, is generally unnecessary in every generation; only the rule in the former is far more strict.

GEOLOGY

The Thermal Conductivity of Certain Rocks.—Professor A. S. Herschel, F. R. A. S., and Mr. G. A. Lebour, F. G. S., in a report read at the recent meeting of the British Association, showed that during the past year the relative conductivity of about thirty kinds of rock has been determined. Among these granite has been found to offer the least resistance to the passage of heat, and coal the greatest. Shale comes next below coal; but between these two and basalt there is a gap of considerable extent, which no rock-resistance has been found to fill yet. Between basalt and granite come all the other rocks examined, including a number of limestones and sandstones of different varieties. By means of a tabulated scale, it will be possible to estimate the equivalent thickness of any stratum (so far as its conductivity is concerned) by reducing it to that of some standard rock, such as granite.

The Brains of Tertiary Mammals.—Professor Marsh, who has been investigating the fossil mammals of the tertiary strata in the Rocky Mountain region, with reference to the relative sizes of brain, has arrived at some interesting conclusions. He states that the Eocene mammals all appear to have had small brains, and in some of them the brain-cavity was hardly more capacious than in the higher reptiles. The largest Eocene mammals are the *Dinocerata*, which were but little inferior to the elephant in bulk. In *Dinoceras*, Marsh, the type genus, the brain is not more than one-eighth the average size of that in existing rhinoceroses. In the other genera of this order, *Tinoceras*, Marsh, and *Unitatherium*, Leidy, the smallness of the brain was quite as remarkable. The gigantic mammals of the American Miocene are the *Brontotherium*, Marsh, the only genus of the family in which the skull is known; the brain-cavity is very much larger than in the Eocene *Dinoceras*, being about the size of the brain in the Indian rhinoceros. In the Pliocene strata of the West, a species of mastodon is the largest mammal, and although but little superior in absolute size to *Brontotherium*, it had a very much larger brain, but not equal to that of existing proboscidians. The tapiroid ungulates of the Eocene had small brain-cavities, much smaller than their allies the Miocene Rhinocerotidæ. The Pliocene representatives of the latter group had well-developed brains, but proportionately smaller than living species. A similar progression in brain-capacity seems to be well marked in the equine mammals, especially from the Eocene *Orohippus*, through *Miohippus* and *Anchitherium* of the Miocene, *Pliohippus* and *Hipparion* of the Pliocene, to the recent *Equus*. In other groups of mammals, likewise, so far as observed, the size of the brain shows a corresponding increase in the successive subdivisions of the tertiary. These facts have a very important bearing on the evolution of mammals, and open an interesting field for further investigation.

The Iguanadon, a Marsupial Animal!—At the recent meeting of the British Association, Mr. Waterhouse Hawkins, F.L.S., F.G.S., made some observations, with graphic illustrations, on a pair of symmetrical bones present with the fossil remains of Iguanadon in the well-known slab from Maidstone, now in the British Museum, and compared those bones with their analogue, as found with a portion of the fossilized skeleton of *Hadrosaurus Foulkii*, in the marl beds of the Cretaceous formation at Haddonfield, in New Jersey, North America. The bones in question had been described by Professor Owen and others as clavicles; but Mr. Hawkins, in making his restorations for the park of the Crystal Palace, was unable, owing to the great length of the bones, to make room for them in his Iguanadon, and therefore he had to abandon them, and make his model in such a manner as would be consistent with the animal being able to walk. A subsequent comparison of the bones with those of the American analogue led to the conclusion that they were abdominal, and the situation which Mr. Hawkins thought they occupied suggested the possibility of the Iguanadon being a marsupial animal.

The Classifications of the Labyrinthodants.—One of the most important papers read in the Geological section of the recent British Association meeting, was by Mr. L. C. Miall, F.G.S. The following points in the characteristics of the labyrinthodants were fully noted, as they differ from the statements usually published in ordinary manuals. The skull may be regarded as an amphibian skull, overlaid by crocodilian plates. The teeth occur on the palate and maxillary in double rows, and are very numerous. Three thoracic plates are present, and the body is covered with bony scutes. They were all, except two genera, provided with four limbs, which may have been penta- or tetradactyle. The vertebræ are numerous, and the tail is long, and, in some genera, makes a most efficient swimming organ. Forty-two genera and 126 species are now known, principally owing to the exertions of recent explorers. Some of these animals, in their mode of life, appear to have been fish-like. Some resembled serpents, others crocodiles, whilst those of Kilkenny appear to have been salamanders. Mr. Miall furnished a tabular view of the classification of the labyrinthodonta, which was divided into ten sections.

Guide to Belfast.—The members of the British Association this year had their visit rendered more interesting than usual by the publication of a "Guide to Belfast" and the adjacent counties, which had been drawn up for the purpose by members of the Belfast Field Naturalists' Club. It was an excellent opportunity for the latter to display their intimate acquaintance with their district, and their efforts were thoroughly successful. The "Guide" is a model of what may be produced by a loving, competent industry. The geology, zoology, botany, archæology, &c., of this wonderful country are fully and accurately drawn up, the illustrations are numerous and graphic, and the industry of the Club was only equalled by its generosity in presenting every visitor from across the sea with a copy gratis. The handsome little volume contains 320 pages, and has a good map showing the position of the tumuli, cromlechs, &c., and the outcrop of the most important geological deposits. The Belfast Field Naturalists won deserved honours during the late meeting of the Association, and were well represented by their ubiquitous and intelligent secretary, Mr. William Gray.

Proceedings of the Liverpool Literary and Philosophical Society.—The proceedings, for 1872-73, of this well-known Society have just been published, and form an attractive, well-printed volume, of 333 pages. Several of the papers are printed in full, and others abstractive. Among the former we have one on the "Strata below the Trias in the country around Liverpool; and the probability of coal occuring at a moderate depth," by a well-known Liverpool geologist, Mr. George Morton, F.G.S. This we regard as the most valuable contribution to the volume. It displays an intimate and accurate acquaintance with the stratigraphy of the district, and the conclusions of the author are a valuable addition to economical geology. Mr. Thomas Ward's paper on "The Cheshire Salt District," which gives both the geology and the mining details of the area in question, is also a well-written and important essay on practical geology. In addition to the above we have a very readable and exceedingly intelligent paper, by Mr. Alfred Morgan, on "Gems and Precious Stones"; and a very elaborate essay, or note, by Dr. Milleu Coughtrey, on "The Heart of the New Holland Cassoway." The rest of the papers are chiefly of a literary or art nature, except that of the Rev. Thomas P. Kirkman, nearly 60 pp. in length, entitled "Philosophy without Assumption," in which Herbert Spencer, Huxley, and others, come in for what the writer intends as castigation. The style seems to us a bad imitation of Carlyle, and the tone too flippant and jocular. We confess to little sympathy with this style of argument. Either Spencer is right or wrong, and we want to know—which? Poking bad fun, and assuming a style of literary mountebankism, will not give us the answer to this important question. What a salvation of literary labour there would be if writers would confine themselves to facts and their proper inferences, and not attempt to obtain a momentary triumph by offensively appealing to the prejudices of the most ill-informed, rather than to the conscientious knowledge of those better able to judge!

NOTES AND QUERIES.

Flax.—The Rev. S. A. Brennan asks for an explanation of the Tyrone farmers' belief that flax must not be steeped "before or after the change of the moon." The answer to this, and all other notions of farmers about the influence of the moon, is that they are all moonshine. No class of people are more incapable of forming correct inferences from facts as to natural pheuomena.—*S. T. P.*

Moles not in Ireland.—An amusing instance of ignorance was given by a famous Scotch seedsman, who, on opening a new shop in Dublin, issued catalogues specifying, among implements in his stock, "mole-traps"!—*S. T. P.*

Ancient Ash-tree.— In the churchyard of Tullaniskin Church, county Tyrone, is an ash, the dimensions of whose trunk are—at the ground, 48 ft. in circumference; at the height of 3 ft., 31 ft.; at 8 ft., 33 ft. It soon divides into several limbs of moderate height and size; but the trunk, viewed from the door of the church-porch, is really a stupendous object, more like a huge rock than a tree. It must be of immense antiquity. Such trees were profoundly venerated by the ancient Irish, and are so still by the natives in many parts of the island.—*S. T. P.*

P.S.—One side of this tree was blown down in the great storm of January 6th, 1839.

A Rustic Superstition.—An amusing instance of folly among Tyrone farmers is that (although for the most part sturdy Presbyterians) they think that flax ought to be sown before Good Friday! They also believe in witchcraft and the bad effect of the "evil eye" on cattle, churning of butter, &c.—*S. T. P.*

Murex purpura.—This is a well-known shell of the family *Muricidæ*, though, perhaps, the fact that a purple dye was extracted from it by the Tyrians is not so well known. The dye was obtained by compressing the larger ones in holes of the rocks, their shells having been previously taken off, and bruising the smaller specimens with their inhabitants in mortars. As each mollusk afforded a minute quantity of colouring matter, the dye became of great value. We learn on trustworthy authority that numbers of broken shells, probably *Murex trunculus*, are still found on the coast of Tyre. M. Boblaye states that traces exist of the employment of *Murex brandaris* for the same purpose on the coast of the Morea. In Chambers's Encyclopædia we read that Tarentum, the modern Otranto, was one of the great murex-fisheries of the Romans, and that they had a number of dyeing establishments there. From Homer we find that the dye was of a dark red colour, and not what is now commonly called purple; and also that it was only worn by princes, though Xenophon, in his "Cyri Anabasis," states that it was the colour of the dress worn by Persian nobles, whom he calls purple-wearers. In Judges viii. 26 we read that the Midianitish kings, who were defeated by Gideon, were clad in purple. The Babylonians used to clothe their gods with it. At the Byzantine court the epithet *porphurogennetos*, meaning "born in the purple," was used of a child born to the reigning emperor. Lastly, Gosse says, in his "Mollusca," that in the reign of Augustus double-dyed purple wool was sold for about £36 sterling per lb. But as wealth would not hesitate at any price to obtain that which was fashionable, laws were enacted rendering it penal for any one but the emperor to wear cloth of this sort.—*W. J. S. Simpson.*

Larva from Paris.—The larva which your correspondent, in the March number of Science-Gossip, mentions as having found in Paris, is certainly the silkworm of the Ailanthus. Both the tree and the insect have become perfectly acclimatized in France, and the latter, indeed, is fast becoming a pest, stripping the ailanthus-trees of their foliage to a vast extent. The larvæ spin their cocoons close to one another, one in each leaf, which they wrap round them, after having spun a thick carpeting of silk along the leaf-stalk and the branch, to prevent the leaf and cocoon from falling to the ground in the autumn. Sometimes groups of forty or more cocoons may be seen dangling from the branches on one tree. This insect, first introduced in 1856 from Japan, is now much more common than ever was a native species—*Saturnia Pyri*, the Great Emperor moth—which feeds on elm and various fruit-trees, and which is now fast disappearing from the neighbourhood of Paris, the large elms on the roads having been cut down during the siege. A friend of mine collected last year upwards of 300 larvæ and cocoons of the Ailanthus moth (*Attacus Cynthia*), all at large, and I gathered perhaps a hundred last autumn without any trouble. The larvæ are fine beasties, remarkable for a kind of whitish powdery bloom, with which they are covered; they feed very contentedly on branches of their food-plant placed in pans of water, and do not wander much. They feed exclusively on the Ailanthus, I believe. The moths, which appear here early in June, are frequently attracted by the light in shop-windows, and occasion much wonder at their size and beauty; and no doubt the bats must find them a toothsome morsel. There are several manufactures in France which work up specially the silk, which is very strong, and well adapted for making cheap goods; but the silk cannot be reeled, as that of the mulberry-worm, and must be carded: the cocoons are in constant demand, at about three francs the pound. The Ailanthus (*Ailanthus glandulosus*) is now being planted on the side-walks of many of our boulevards: it grows exceedingly well, and nothing besides the silkworm appears to touch it. Like the Acacia (*Robinia pseudo-acacia*), it grows perfectly wild wherever it has been introduced; its foliage in the autumn is very beautiful, being of a fine red colour.—*E. L. Ragonot, 27, Rue de Buffon, Paris.*

Seaside Shrubs.—The common juniper (*Juniperus communis*) grows in the greatest luxuriance on the mountains of Dumfriesshire, Scotland. I have also found it growing on the sea-banks of the county of Durham; but it does not seem to attain to the same luxuriance as on the mountains. Never having seen it cultivated in such near conjunction to the sea, I cannot say much as regards its ornamental properties; but I believe, by a little care and study, that the Juniper might be successfully cultivated so as to bear a high character of being a highly ornamental evergreen. Possibly some other readers of Science-Gossip may have tried its culture by the sea, and will give its history as far as observed.—*J. Brown, Sunderland.*

Tortoises and Eggs.—It may interest Mr. C. F. W. T. Williams to know that a year or two ago I also procured a tortoise from London, I believe in May, and it had the run of a large garden all the summer and autumn. At the latter end of December, owing, I suppose, to the unusual mildness of the weather, it began to take its walks abroad, and one day was found dead. At the earliest opportunity I opened it, but, owing to the hardness of the carapace, I was obliged to use much force. When the body was laid bare, I found three eggs, about the size of a small pigeon's egg. The shells were white, and, with the exception of the two ends being of nearly equal curvature, would easily have passed as birds' eggs. Unfortunately, two were broken during the operation, and the third immediately afterwards, accidentally. I do not remember seeing traces of any other eggs. The inside appeared similar to other eggs; the yolk was rather large.—*A. C. Haddon.*

F. vesca and P. fragaria.—I should feel obliged if you or any of your correspondents can furnish me with a good *general* distinction between *Fragaria vesca* and *Potentilla fragaria* (Lindley). There appears to be no little difficulty encountered by young botanists in distinguishing them by the characters usually given. The principal differences are not exhibited until the fruit ripens; but if a characteristic feature exists and is permanent in one or the other, I should be glad to hear of it.—*H. Marshall Ward.*

Electricity.—The phenomena described by George Roberts, on page 95 may be observed when one strokes a cat which has been lying before a fire or in the sunshine: if the fur be very warm, the electricity is sometimes sufficient to make it stick together as if it were wet; and if a finger be approached to the fur, it will rise on end and touch the finger. Even the human hair, when pomade is not used, will crackle and emit sparks when a comb is drawn through it.—*F. J. Allen.*

Orthogoriscus.—I once found a specimen of *Orthogoriscus mola*, and was much struck by some peculiarities in its anatomy. Dr. Spencer Cobbold (*Intellectual Observer*, vol. ii. p. 86) states that the Professor of Anatomy, University of Edinburgh, anatomized a large specimen of the fish in 1856. Can any of your readers inform me of his name, whether he published his observations, and if so, where they may be found, or refer me to a good anatomical description of Orthogoriscus?—*L. N.*

BOOKS, &c. RECEIVED.

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"Canadian Entomologist." August.
"Ben Brierley's Journal." August.

Communications Received up to the 11th ult. from:—T. B. W.—C. G. B.—G. G.—A. de S. G.—E. A. H.—T. McG.—C. F. W. T. W.—R. L.—E. E. E.—R. N. V.—F. G.—M. S. J.—A. H.—B P. P.—C. W.—J. L.—G. O. H.—G. C. D.—J. H. W.—T. H.—A. Y. C.—T. D. M.—G. H. P.—A. H.—J. K. J.—A. W.—H. E. W.—W. B. M.—D. J. P.—J. H. A.—W. T. S.—J. L. J.—T. W. G.—G. J. J.—M. J.—T. G.—W. T.—T. I. B.—B. E. S.—H. B. T.—S. A. B.—W. F. R.—F. H. A.—J. W. F.—H. M. W.—W. C.—W. H. H.—A. L.—Dr. C. H. B.—J. M. M.—W. H. R.—Dr. T. W. W. S.—F. E. L.—C. K.—A. B.—M. A. L.—J. B.—E. F. B.—G. A. L.—H. G.—J. R. S. C.—J. K.—Dr. M.—J. S. H.—W. E.—J. W. S.—W. H. G.—P. Q. K.—L. S. S.—C. W.—M. P.—L. R. R.—W. H. G.—W. H.—W. W. S.—D. D. B.—F. C. S.—T. W.—W. H.—R. W.—R. G. A.—E. W.—J. H. A. J.—C. S.—Dr. C.—A. B.—E. D. C.—Dr. M.—H. C. M.—O. W.—W. T. B.—G. O. W.—A. B.—G. O. H.—H. B. T.—F. W. M.—J. S.—C. F. W.—G. A. L.—G. C. D.—Dr. C. C. A.—E. F. E.—J. A. jun.—E. E. S. P.—H. J. McG.—J. K. J.—W. M.—R. B.—J. F. R.—M. C. C.—A. N.—W. S.—J. W. R.—C. L. J.—F. H. A.—H. P. M.—J. J. P.—C. P. G.—M. R. S.—W. T.—J. E. R.—H. S.—W. M.—W. F. S.—T. H. P.—W. H. S.—H. W.—W. R. H.—W. E.—B. M.—J. G. R. P.—&c.

NOTICES TO CORRESPONDENTS.

W. H. Gomm.—Your flowers were too much decomposed for identification. You should have sent them in a dried, not in a wet state. Send some *dried* specimens.

L. R. Raymond.—Your plant is the yellow Iris (*Iris pseudo-acorus*). The bivalve is the "Swan Mussel," (*Anodon cygneus*).

J. K. Jackson.—The specimen was, as you said, very much crushed and unidentifiable. It appears to be the young of the Sea Mouse (*Aphrodita aculeata*), a marine annelid.

E. A. Hall.—Your list of lepidoptera sent for exchange would fill at least a dozen lines, and three are all we can allow, unless as advertisements. Could you not cut up the list into two or three "exchanges"?

E. E. Evans.—1. Your plants are the Soap-wort (*Saponaria officinalis*), belonging to the nat. order *Caryophyllaceæ*. 2. First get your aquarium into a balanced condition by means of fresh-water snails (*Lymnea*, *Paludina*, &c.), which will eat away the green confervæ, before you put in your fishes. 3. You will find an account of how to proceed with the eggs of the Goat-moth in Newman's "British Moths." 4. We do not know why you have not succeeded in sugaring. Persevere!

J. L. Wigan.—No exchange inclosed in your envelope.

G. H. P.—We do not remember having seen a bifurcated leaf of the common Laurel before, and are glad to put it on record.

W. B. Marshall.—See article on "Collecting and Preserving Flowering Plants," by James Britten, F.L.S., in May No. of Science-Gossip for 1872. You will be able to get botanical drying-paper, of the needful sizes, from any natural-history dealer in London.

J. H. A. (Dover).—Thanks for your exquisite sketches of antennæ of butterflies and moths.

M. J.—No fern inclosed.

B. E. Smith.—Your specimen is the pretty Grass of Parnassus (*Parnassia palustris*).

F. E. L.—The parasitic insects on the back of the leaf sent, are the "Scale Insects" (female), a species of *Coccus*, allied to the cochineal insect, probably *squamifera*.

M. R. Shaw.—Your terminal portion of the frond of *Osmunda regalis*, although not quite the usual mode of growth, can hardly be termed abnormal. It has probably been arrested in its further development by the dry season.

Ento (Hull), who inquired for some liquid in which to preserve insects for subsequent dissection, cannot do better than try glycerine. It is preferred to spirits by American naturalists, on account of its being free from the inconvenience complained of by "Ento."—C. P. G.

S. Pearce.—Your two fungi are *Polyporus varius*. See Cooke's "British Fungi," vol. i.

W. Hamborough.—The micro-fungus on leaves of coffee-plant is *Hemeleia vastatrix*, B. & Br. See "Gardener's Chronicle" for 1873.—M. C. C.

J. H. A. Jenner.—Your Puccinea on leaf of "Sweet William" is the "Lychnis Brand" (*Puccinea lychnidearum*). See Cooke's "Handbook of British Fungi," vol. ii. page 505.

Miss Saunders.—Your specimens supposed to be fungoid germs on red currants, are not fungi at all, but probably some insect secretions.

W. M.—All communications sent to the Editor for this correspondent have been duly forwarded to him.

Flints.—Will the correspondent who sent us some fragments of flint with supposed lichens or fungi attached to them, kindly send us his name and address, as they have been mislaid?

W. Putman (Hebden Bridge).—*Hypnum rusciforme*, *Fissidens pusillus*.

W. B. Hegg (Pennycuick).—1, 3, 4. *Mnium hornum*; 2, 5. *Bryum capillare*.

B. Belfield (Rochdale).—1. *Hypnum sericeum*; 2. *H. plumosum*; 3. *H. rutabulum*; 4. *H. fluitans*; 5. *H. filicinum*; 6. *H. serpens*.—R. B.

W. E. (Oxford).—Plants, No. 1. *Valeriana officinalis*, L., not at all uncommon in damp or shady places; 2. *Lysimachia vulgaris*, L.; 3. *Chlora perfoliata*, a species frequent in chalky places.—R.

J. K. (Newport, Mon.)—It is impossible to name specimens, without leaves, in fact nothing but the flowers, or fruit. They are probably, *Linaria repens*, and *Centaurea nigra*, L. Send in future none but perfect specimens, and we shall feel a pleasure in naming you as many as you wish.—R.

Dr. Morton.—The specimen labelled No. 1, which you think is *Pimpinella magna*, is *Sison amomum*. *P. magna* is very rare: the one marked No. 2 is the more common *Pimpinella saxifraga*.—R.

W. T. B.—No charge is made for "exchanges," unless they exceed three lines in length.

EXCHANGES.

For living specimens of *Helix carthusiana*, send box and postage to J. H. A. Jenner, Lewes. Any local species acceptable.

For Seeds of *Cuscuta trifolii*, send stamped directed envelope to W. H. Gomm, Somerton, Taunton.

Good sections of Cedar, Quillai Bark, and Yew, well mounted, offered for other good Slides.—E. Lovett, Holly Mount, Croydon.

Four varieties of Foreign Diatomaceous Earths, for good Slides or Material.—T. Gardner, Queen's-road, Watford.

Duplicates: Pupæ of *P. machaon* and imagos of *T. quercus*, *A. adippe*, and *Z. loniceræ*. Desiderata: *A. iris*, *C. hyale*, *A. paphia*, *A. atropos*, or offers.—D. J. Preston, Riversfield, Catton, Norwich.

For a small section of the Bread-fruit Tree, send stamped directed envelope to W. H. Hey, Upminster, Romford.

Pollen of *Catalpa seringafolia* (rare), mounted in damar, for an equally good Slide.—E. Lovett, Holly Mount, Croydon.

For Toome Bridge Diatomaceous Earth or mounted Scales of Podura or Lepisma, send good Slides or Material to G. J. Johnson, Hale, Altrincham.

Micro-fungi (named) for Marine Polyzoa.—Mrs. C. F. White, 42, Windsor-road, Ealing.

Wanted, a few fronds of *Wolffia arrhiza* (dried); Sussex Flowering Plants in exchange.—Rev. F. H. Arnold, Fishbourne, Chichester.

First-class Micro-slides for Mole Crickets, Great Green Grasshopper, Giant Cockroach, Locusts, Field Crickets, or good foreign specimens of the Grasshopper, Locust, Cricket, or Cockroach families.—C. L. Jackson, 11, Hisketh-street, Southport.

Duplicate British Birds' Eggs, Eagle, Osprey, Diver, Auk, Bustard, Crane, &c.—Apply to T. H. Phuler, Vale Royal, Northwich, Cheshire.

Rare Shells offered: *Clausilia rugosa*, var. *Schlechtii* (new and rare variety, recently determined by Mr. Jeffreys), *Helix obvoluta*, *Helix revelata*, *Pisidium cinereum*, *Clausilia dubia*, *Pupa anglica*, *Pupa edentula*, for other named rare Pupas or Vertigos, or *Testacellas*, *Succinea oblonga*, *L. involutus*, *L. glutinosus*, or *Acme lineata*.—W. F Sutton, Gosforth-grove, near Newcastle-on-Tyne.

Bulbs of *Gloriosa superba* just received from India; also Wings and Feathers of Indian birds, for good Micro slides or Books on Microscopy, especially Micro-Dictionary.—Apply to W. M., Post Office, Epsom.

Section of Human Clavicle sent on receipt of stamped envelope and other Objects; good Slides in exchange for others.—Tylar, 165, Well street, Birmingham.

Land-shells, chiefly West Indian, for others. Lists exchanged; British not required.—C. P. Gloyne, 3, Great George's-street West, Cork.

Spiracles, &c., of Foreign Moth (*Bombyx Cecropia*) offered for Named Diatom Slides, or good Microscopical material.—Edward Ward, Higher Broughton, Manchester.

First-class Slides of *Navicula bombus*, *Odontidium undulatum*, *Rhabdonema arcuatum*, *R. minutum*, *Fragilaria assumis* and *undosa*, for other really good Slides.—H. B. Thomas, Boston, Lincolnshire.

For *Sertularia operculata* and *Hydrallmania falcata*, send stamped envelope and object of interest to A. Haward, 1, Shirley-villas, Addiscombe-road, Croydon.

For unmounted Palates of Chiton and Pearly Sop (wanted Animal Parasites, &c.), send stamped envelope to J. Macfarlane, Links, Kirkcaldy, N. B.

Diatoms, Spicules, Fungi, Plant Hairs, &c. (good Slides), for material containing *A. Ehrenbergi*, *A. Oreganus*, *A. Kittoni*, *E. argus*, any Isthmia or Auliscus.—J. K. Jackson, Oldbury, Birmingham.

Chemistry.—I have for exchange: Bunsen Burner, with rose and tube, Retort Stand, Spirit Lamp, Pestle and Mortar, &c., and a few pure Chemicals. Full list on application.—F. G., Box B, 50, Post Office, Leeds.

Spartina alterniflora for good specimens of any of the following:—Nos 59, 72, *officinalis*; 147, 148, 216, *dubium*; 244, 395, 380, 386, 472, 518, 600, 655, 768, 805, 898, 930, 944*, 996, 997, 1042, 1063, 1077, 1086, 1089, 1108, 1131, 1206, 1280, 1281, 1308, 1345, 1366, 1418, Lon. Cat., 6th ed.—Address A. B., 107, High-street, Croydon.

Cuticle of House-leek, Pollen of Ox-eye Daisy, Sunflower, and *Cuphea ignea*, Gizzard of Cockroach, Gizzard of *Gryllus viridissima*, Spines of Echinus, Sting and Poison-bag of Wasp, all mounted, offered in exchange for good Mounted Slides.—G. Garrett, Harland House, Wherstead-road, Ipswich.

Helix lamellata and *Zonites excavatus* for *Sphærium corneum*, var. *nucleus*; *Pisidium fontinale*, vars. *Henslowana*, *pulchella*, and *pallida*, or *P. nitidum*, var. *splendens*, or any good varieties.—J. Whitinham, Cross-lane, Marsh, Huddersfield.

Lycopus europæus, *Atropa Belladonna*, *Artemisia Absinthium*, *Polygonum hydropiper*, for *Gagea lutea*, *Ranunculus philonotis*, *Potentilla verna*, *Viola palustris*.—G. C. Druce, Northampton.

Swallow-tailed (*P. Machaon*).—A few Pupæ in exchange for any of the following:—*B. cecropia*, *B. pernyi*, *B. polyphemus*, *Saturnia Io*, *Actias luna*.—Answers within a week.—Robert Laddiman, Cossey-terrace, Upper Hellesdon, Norwich.

THE HISTORY OF OUR CULTIVATED VEGETABLES.

No. VI.—THE CARROT (*Daucus Carota*).

THE next vegetables most in use, after those already described, are perhaps carrots and parsnips, both of which appear to be indigenous to Britain. They belong to that extensive order, the *Umbelliferæ*, which contains a large number of poisonous and deleterious plants, such as the Hemlock (*Conium maculatum*), Fools' Parsley (*Æthusa Cynapium*), &c., as well as many species of harmless and wholesome vegetables.

The Carrot was known to the ancient Greeks and Romans. Theophrastus states, in the ninth book of his "History of Plants," that carrots grew in Arcadia, but that the best are found in Sparta. Petronius Diodotus, a Greek physician who lived in or before the first century after Christ, and is said to have written a work on botany, mentions four kinds of this root, but there is some reason to think he includes the parsnip with them. Pliny states that the best kind of carrots in his time came from Candia, and the next to them were grown in Achaia. This author observes that the root bears a similar degree of resemblance to the parsnip, and that, in whatever country they grow, the best are produced in sound dry ground, and that wild carrots are to be found in most countries, but never in poor soils. This vegetable is minutely described by Dioscorides (a physician and botanist who lived in the time of Nero); he states that it was reared in gardens on account of its esculent root. It is difficult to trace the progress of the carrot since that period, but it appears to have been always an object of cultivation among various nations. We are indebted for its introduction to the Flemings, who, in the reign of Queen Elizabeth, sought refuge in England from the insupportable tyranny of their Spanish master, Philip II. Finding the soil about Sandwich, in Kent, very favourable for the cultivation of the carrot, the emigrants soon engaged in its production on that spot. The English, whose knowledge of horticulture was at that time extremely circumscribed, were in this case well pleased to add another edible vegetable to the scanty list which were then under general cultivation. The carrot, therefore, unlike the turnip, grew quickly into esteem, and being made an object of careful cultivation, was very shortly naturalized throughout the island. Gerard calls these plants *Daucus Cretensis verus*, or Candie carrots, and says that "the true Daucus of Dioscorides does not grow in Candia only, but is found upon the mountains of Germany, upon the Jura, and about Geneva, from whence it hath been sent and conveyed by one friendly herbalist unto another into sundry regions." He adds that in his time the carrot was most commonly boiled to be eaten with fat meat, but he did not esteem it to be a very nourishing food.

In its wild state the carrot has a tough root of a whitish colour, and is very common on calcareous soils, where it is easily recognized in the early summer by its concave umbels, resembling in shape a bird's nest; hence the origin to one of its common names. The flowers, which are white, are succeeded by fruit covered with prickles. Many attempts in former days have been made by Miller and other horticulturists to change by culture the wild carrot into the esculent one, but they were unsuccessful. Perhaps the cultivated one was first fostered into its present value under a warmer temperature than Britain. A writer in the *Gardener's Chronicle* (1865, p. 1154) states that he had procured in a few generations from wild kinds large, fleshy, fibreless roots of red, white, or yellow colour, some short, some of moderate length, others very long. These varieties are fixed for the most part, and constitute races that do not vary. In the same paper it is mentioned that M. Carrière, from the seed of the wild carrot, gathered by himself in the department of Aube, far away from any residence and in comparatively inaccessible situations, obtained in the first generation long, spindle-shaped, soft, fibreless roots, some of which were white, others yellow, and some were even of a reddish violet colour. And as with carrots so also with parsnips.

In Belgium and other continental countries the carrot has been grown as a field-crop for a longer time, and to a much greater extent, than in Britain. The first notice we have of its being introduced into our field-culture to any great extent is by Arthur Young, who mentions its being grown in the sandy soil of the eastern division of Suffolk, whence it had in all probability been introduced from the opposite shores of Belgium and Holland. In the year 1765 the attention of the Society for the Encouragement of Arts, &c., was directed to this branch of husbandry, and in consequence, an

Fig. 165. Wild Carrot (*Daucus Carota*).

account of the culture of carrots and the uses to which they may be applied, was published by Robert Billing, a farmer in Norfolk, who states that he obtained from twenty acres and a half five hundred and ten loads of this root, which he found equal in use and effect to a thousand loads of turnips, or three hundred loads of hay. Some of them measured two feet in length, and from twelve to fourteen inches round. Horses are remarkably fond of carrots, and when mixed with oats they form very good food for them. The efficacy of these roots in preserving and restoring the wind of horses had, it is said, been partially known in Suffolk, where carrots were administered as a secret specific for the complaint long previously to their being commonly applied as food for that animal. Carrots are equally beneficial as nourishment for cows, sheep, and swine. It was stated some years since that at Purlington, in Yorkshire, the stock of a farm, consisting of twenty working horses, four bullocks, and six milch cows were fed from the end of September to the beginning of May on the carrots produced from three acres of land. The animals, during the whole of that period, lived on these roots, with the addition of only a very small quantity of hay.

According to Campbell's "Political Survey," carrot-seed has been made a considerable source of profit to the cultivator, for he states that in the latter part of the last century a farmer in Essex obtained from an acre of land sown with this vegetable ten cwt. of seed, which he sold in London at £10 per cwt. The kinds that are commonly grown are the long and the horn carrot. The first of these is subdivided into other varieties, differing in size and colour. The large, red field-carrot, which is cultivated as food for cattle, belongs to this class. The horn-carrot, having a shorter and smaller root, is a good crop for a shallow soil, but does not keep so well through the winter.

In the Channel Islands and Brittany the carrot and parsnip are more extensively cultivated than in Britain, the soil being deeply trenched by the spade or by a plough constructed for the purpose. The number of acres under carrot cultivation in the United Kingdom, according to the returns for 1873, was 19,891.

When a carrot is cut transversely, it is found to consist of two parts of different colour and texture. The outer, called the corticulous part, or rind, is of the darker colour and of the more pulpy consistency. The inner, or heart-wood, especially when the root has attained its full size, is more fibrous or stringy, and if it be separated, it is bristled over with hard points or fibres, that extend to the rootlets outside. Almost the whole crown of the root, or that part which sends up the leaves, is connected with the wood, and only the epidermis, or outer skin of the leaves and stem, with the external portion of the root.

Carrots contain a large amount of water, 86 parts in 100 lb. Their most distinguished dietetical substance is sugar, of which they possess nearly 6½ per cent. Starch is also found in small quantities, with a small portion of albumen. The ancients used the seed both of the wild and cultivated carrot as an internal medicine against the bite of serpents; they also gave it to animals that had been stung by them.

Dr. James says carrots strengthen and fatten the body, and are very proper food for consumptive persons. The root of the garden carrot is much used as a poultice for cancers, on account of its antiseptic qualities. In some parts of Europe a spirit is distilled from this vegetable. The abundance of sugar contained in the roots is readily converted into alcohol. About 160 lb. of the crushed roots are required to yield one gallon of spirit. Sugar has been obtained from them, but notwithstanding the large amount existing in them, the manufacture has not been found profitable. In Germany, a substitute for coffee has been made of the roots chopped up into small pieces and partially carbonized by roasting. A dye similar to woad has been obtained from them. (See Johnson's "Useful Plants of Great Britain.")

Parkinson, botanist to James I., tells us that ladies of his time used to decorate their hats or heads with the leaves of the wild carrot, which in the autumn are exceedingly beautiful. This, says Phillips, would rather show the simplicity of our ancestors than their want of taste; as we have seen ladies' dresses trimmed with the curled leaves of the garden parsley, and which were not more admired for their novelty than for the elegance they displayed.

If in winter a section be cut from the end of thick part of the root, and this be placed in a shallow vessel containing water, young and delicate leaves are developed, forming a radiated tuft, the graceful and verdant appearance of which makes it a pleasing ornament to a room in that season when any semblance of vegetation is a welcome relief to the eye. Flowers may be cut out of large carrots that closely resemble ranunculuses, without the least aid of colouring. The name of this genus of plants is supposed to be derived from *daio*, "I warm." The specific name seems to have reference to the colour of the root, and to have its origin in the Celtic word *car*, which means *red*. (See Syme's "Ency. Bot.") HAMPDEN G. GLASSPOOLE.

FIELDFARES.—On Thursday, August 13, I observed a large flock of fieldfares in the parish of Pomeroy, county Tyrone. Being migratory birds, and not generally seen until October, is it not strange that they should visit us so early?—*Rev. S. A. Brenan.*

LOCAL NATURAL HISTORY NOTES.

NO. I.—BUSSAGE, NEAR STROUD, GLOUCESTERSHIRE.

I SHALL commence with a few words about the geology of the district, as of course all the other natural history characteristics depend upon it.

The country is very hilly, and these hills consist of, I believe, the inferior oolite limestone and clays that occur with it. Some of the hill slopes are very steep, and in general configuration and herbage strongly resemble chalk, but differ in having copious springs breaking out on most of them. The alternations of hard and soft strata, I am told, occasion small landslips in the neighbourhood.

Some of the Oolitic fossils are very numerous about Bussage, and it is possible to pick up lumps quite full of two species of *Terebratula*; though, I believe, the richest spot for fossils is at Dursley, some twelve miles off. A piece I got there has a cast of what I take to be *Trigonia costata*, a common fossil in this formation, with a number of sea-worms' tubes across it. The stone of the neighbourhood is much used for building, and for the stone walls which here take the place of hedges. These walls are built "dry," as they are stated to last longer without mortar. The ordinary walls, composed of rough fragments of stone and overgrown with moss and weeds, give a very characteristic sample of the geology, botany, and zoology of the district. Nearly all the common fossils of the local formation may be seen while walking by a hundred yards of one of these walls, and a great many plants and ferns find shelter and foothold on them. Herb Robert (*Geranium robertianum*) is perhaps one of the most beautiful when the leaves and whole plant turn a vivid carmine colour, affording a lovely contrast with the grey weathered stones and patches of dark green moss. Then the loose stones at the top give shelter to a fair share of the mollusca of the district, including that minute little snail *Helix rupestris* in great numbers, and others of a less local character; as *Clausilia rugosa*, &c.

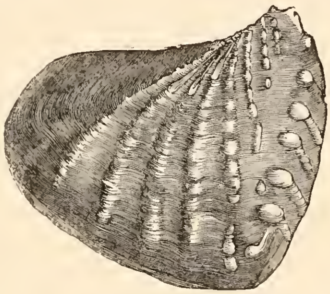

Fig. 166. A common Oolitic fossil (*Trigonia costata*).

BOTANY.—The district of Toadsmoor Valley, adjoining Bussage, to which these notes apply, is well wooded with beech, although it has been partly cleared to supply beech-wood to a walking-stick and penholder-mill in Chaleford Valley, where it is turned up into these articles. A striking peculiarity is the total absence of gorse or furze on the hills and wastes. A common studded with bushes I took for furze in the distance, turned out to be wild rose and brambles. Heather is also not to be found.

Perhaps one of the most conspicuous plants is the Rose-bay, or flowering willow (*Epilobium angustifolium*), which grows on the walls, quarries, and slopes. At Dursley, before-mentioned, there were some hill-slopes so covered with it as to seem rose-coloured a mile off. Two other species of Cranesbills are common to the district, besides the Herb Robert, one of them being the very beautiful meadow Cranesbill (*Geranium pratense*), which grew even on the tops of the hills where the soil was damp, and the other species *Geranium lucidum*.

In the beech-woods of Toadsmoor Valley two rather local plants occur, *Epipactis latifolia*, the Broad-leaved Helleborine, and *Campanula glomerata*; the green Hellebore (*Helleborus viridis*) also grew there; its deeply divided leaves reminded one rather of a small hothouse palm.

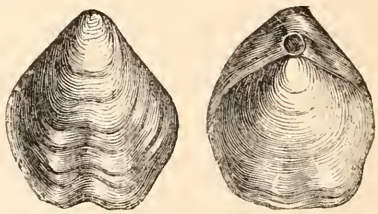

Fig. 167. An abundant Oolitic fossil (*Terebratula biplicata*

The large-flowered St. John's Wort (*Hypericum calycinum*) was also a denizen of this valley, but the place to see it in perfection was at Woodchester Park, a few miles off. Some of the slopes there were perfectly covered with it, and looked quite golden-coloured from the number of its almost symmetrically-arranged flowers, which are remarkable even in the distances between them. A lady residing in Bussage tells me that before the common was enclosed the Moonwort fern (*Botrychium Lunaria*) used to grow there, but I am afraid it is extinct now. The little black Spleenwort *Asplenium trichomanes*, with the common Hart's-tongue and Wall-rue (*A. Ruta-muraria*) still grows on the vicarage walls.

ENTOMOLOGY.—The wood-ant (*Formica rufa*) is very abundant on some of the wooded slopes: as a general rule, they choose spots that are open to the morning sun. One nest in a larch plantation was larger than any I remember seeing before, and would be fully three feet six inches high through the centre, and was just the shape of a well-formed apple-pudding.

It is curious to note how well the colour of the material used for the nest and the general rubbish on the ground in a wood assimilate with the dusky black and tawny red of the ants; those hills made of the leaf-sheaths of the beech are almost exactly the colour of the ants. A large nest of the sort I saw must be the work of more than one year, though exactly how long they are constructing such a nest I cannot say. The ants are very pertinacious in the way they carry their runs right across a road in spite of the traffic, which must destroy a good many. One small nest, by the side of a pathway, which I disturbed, I found had been quite deserted, and the ants were going between it and another small temporary nest to a new spot. I watched them carrying eggs, pupæ, and ants along during the few hours of fine weather. The ants that were being carried were held under the carrier upside down in their jaws, and were folded together very compactly. They shifted their quarters again from this new nest, apparently not satisfied with the situation. There appeared to me to be a vast lot of useless labour in their proceedings. One ant would carry back a pupa that another had just carefully brought out of the nest, and two would get hold of opposite ends of the same bit of stick, and pull in opposite directions. They did not carry away any of the materials of the deserted nest, but got fresh ones each time.

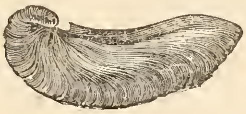

Fig. 168. Lower Oolite (*Gryphea virgula*).

These ants are rather uncertain in their distribution. I never met with any while in South Devon. They do not seem confined to any particular soil, as they are common on the sand at Weybridge, in Surrey, on chalk and limestone, and on granite at Linton, in North Devon.

Another conspicuous insect occurring at Bussage was the Great Saw-fly (*Urocerus gigas*). I saw several specimens; one settled on my coat while sketching—I suppose attracted by the smell of the turpentine I was using. Their frequency was no doubt owing to the larch woods in Toadmoor Valley, on the timber of which the larvæ feed.

The present year has, I think, been a very bad one for lepidoptera, from the coldness and rain, at any rate in the west; so I had not a fair opportunity of judging of the lepidoptera of the district; but certainly there was no great abundance of even common species, except the Cinnabar Moth (*Callimorpha Jacobææ*), which was quite a pest, and during August every road, wall, and walk abounded with its yellow and black ringed caterpillars, which in many places had eaten up every scrap of ragwort and groundsel, and were rapidly crawling about for more food. They were so numerous that they must have done good service in destroying these two weeds they feed on. One of the "footman" moths, called the "Muslin" (*Nudaria mundana*), came to light very freely, and must have been very plentiful there. The scarce Magpie Moth (*Abraxus ulmata*) also abounded in the district.

Fig. 169. Great Saw-fly (*Urocerus gigas*).

Mollusca.—The land and fresh-water mollusca of the district did not strike me as being very rich in species, although the individuals were plentiful. *Planorbis albus* and *P. nitidus* occurred in the large pond at the bottom of the valley; but I could find no *Limnea pereger* there. There were traces of *Anodonta cygnea* in the shape of dead and broken shells. The most interesting species to me was *Pupa juniperii*, which I found amongst loose stones on an old pasture slope, in company with *Bulimus obscurus*.

Zoology.—Toadsmoor Valley gets its name from the number of frogs and toads that swarm there. On a warm damp night it is hardly possible to avoid treading on them. It is easy to see how a story of a toad in rock might occur here, as they retire to all sorts of crevices in the oolite, which is very damp, and would very likely turn up in quarrying.

At the end of June, when I first went there, all the young frogs, which were blackish and about three-quarters of an inch long, were leaving the pond at the bottom of the valley, and beginning their ascent of the hills. There were swarms of them, and on the damp days, of which we had so many, they went steadily hopping over the path and up into the woods. They continued doing this all the month. One lot I noticed in the afternoon were going up over the path for a long time, and when I looked at them again, they had all, as if by one consent, turned, and were progressing along at right angles to their former course; for what reason I was not able to find out. The owner of the furthest-up mill in the valley tells me that his mill-pond used to be piled up with spawn, but since some change of chemicals used in work, there had been less than there used to be. I am told both the ringed snake and the adder were rather plentiful. I only saw one of the former snakes.

In conclusion, I may notice, with reference to Mr. F. Stratton's interesting article on variation of colours in flowers, a pinkish-red variety of the common yarrow or millefoil (*Achillea millefolium*), which occurred plentifully in company with its usual white-flowered form. I have also seen the same variety at Erith, and think it is a pretty common variety. Is white the normal colour of the flower?

I forgot, while on the subject of geology, to mention that a very fine specimen of a molar tooth of an elephant, most probably the fossil *E. primigenius*, was dug out of a superficial deposit at Stroud, and a gentleman residing at Bisley, who had this tooth, showed me some boars' tusks he had found in that neighbourhood.

Southampton. HARRY LESLIE.

SPECULATIONS CONCERNING THE USES OF COMETS IN THE UNIVERSE.

By JOHN I. PLUMMER, M.A.

THOSE who have endeavoured to push scientific research into the realms of the unknown, cannot fail to have remarked how numerous are the hypotheses which at one time or another have engaged their attention, each in its turn to be rejected, when it fails to receive confirmation by agreement with observed facts. Such is the method of scientific progress, which advances only on the wreck of misconceived theories. Yet it frequently happens that these "guesses at truth" may contain the germs of important discoveries; for how often will it occur that he who originates the theory is without the means of testing it by experiment, or is unable to pursue those observations upon Nature, specially designed for the purpose, that may be necessary before it is possible to pronounce upon the truth or falsehood of a favourite proposition. These remarks apply more particularly to the case of astronomy, a science in which all the more ordinary phenomena have received their appropriate solutions, and in which the explanation of the more infrequent will often require years of observation to verify. May we not therefore conclude, that while it would not be advisable to publish these unestablished theories in the purely scientific journals, they might well find a place in SCIENCE-GOSSIP, so that what is incomplete, hazy, doubtful, in the mind of one may be improved, confronted by observation, and developed by another? Moreover it may be remarked that any theory, even though erroneous, provided it explain some portion of observed data, is useful. A bad theory is often better than none at all. No better example of the truth of this paradoxical assertion can be given than the celebrated but now utterly discarded law of Bode, which suggested to Olbers nearly a century ago, the possibility of a planet situated between Mars and Jupiter having been dashed to fragments by some catastrophe. We now know that Olbers' theory was as erroneous as Bode's, but we are nevertheless indebted to the bold enunciation of these false suppositious for the discovery of the group of the asteroids, whose numbers now fast approach one hundred and fifty members. Happily it would seem very unlikely that astronomy is in any danger of being overburdened with these theories. No part of the celestial economy, save perhaps the comets, admit of much speculation, and perhaps an attempt to guess at the part they play in the universe may assist in unveiling the mystery that has always hung about these bodies.

In the first place, there seems some reason to complain that their weight and importance have been considerably under-estimated. The facts relied upon by those who believe in the insignificance of comets are, first, that Lexell's Comet in 1779 passed very near to Jupiter without producing any marked disturbance among the satellites of that planet, and, secondly that Encke's Comet has passed near to Mercury, also without causing any observable perturbations. Both these bodies are, or were, members of that group of periodical comets which revolve round the sun in periods not greater than seven years, admittedly the smallest and faintest of their class. The latter has no stellar nucleus, and may well be a body of slight mass, and the former has not been seen since 1770, having been diverted from its orbit by the powerful attraction of Jupiter; nor am I aware whether any record remains of its appearance to enable us to judge relatively of its dimensions or mass. Another fact suggesting the impalpability of comets is the transparency of their tails, comæ, envelopes, &c.,* which would be a fact of little importance in itself, but which strengthens an opinion already formed of their imponderability. On the other hand, the

* It is often asserted that stars have been seen through the nucleus of a comet, but this is doubtful, at least in the case of comets with stellar nuclei; in the case of comets which have only a condensation at or near the centre of the coma, it is not unlikely that they may be transparent, but the opportunity of seeing a star so centrally situated must occur very rarely indeed.

proved connection of comets with streams of meteors points to a greater mass for the former. The number of components of a meteor-swarm is without question very great, and each individual member of the group has a sensible weight, so that the total mass becomes much greater than that generally assumed for the comet itself. Now whether we consider the comet to be an aggregation of meteors, or a single meteor very much larger than the rest, it would seem certain that it cannot be so despicable a body as has generally been believed.

In order to collect all the available information before I venture to suggest what may be the peculiar function of comets, I must refer to their chemical constitution as indicated by spectroscopic observation. Three, if not four, comets, including the bright comet of the present year (Coggia's), have been found to yield spectra identical with that of the electric spark when taken in olefiant gas, and the conclusion we must draw is, that carbon in some form or other is the principal constituent of those comets. Several others have yielded a characteristic spectrum differing from this, and which has not been identified with that of any terrestrial substance. We may not say that this will prove a new elementary body, for greater knowledge of the variety of spectra obtainable from terrestrial substances under different circumstances is needed before making such an assertion, and it is more likely that eventually it will be identified with some known element. From the simplicity of the spectrum, and its general resemblance to that of the carbon comets, we are perhaps entitled to assume that they consist mainly of a single elementary substance of somewhat analogous character.

Other comets may possibly be similar to the meteors, their attendants, which have again and again been analyzed. In them, iron in great quantity, nickel, cobalt, silicon, and a variety of other substances, chiefly metals, have been found. Now, all these substances are in strong contrast to those which have been identified in those voluminous bodies, the nebulæ. Two of the three bright lines which ordinarily constitute their spectra, have been shown to be due to the presence of nitrogen and hydrogen, both gases incapable as yet of being liquefied ; to which class of bodies the third also doubtless belongs. If we imagine all space to be occupied by roving comets, and the enormous if not infinite distances to which they recede from the sun favours such a supposition, it is certain that more or less often they must come into contact with some portion of the extended contour of the nebula, and be retained for ever in the matter thereof by chemical union with its substance. In the course of ages a very large number of comets of various composition would become part and parcel of the nebulous matter, which would more and more tend to the liquid, and upon cooling to the solid form, a number whose total mass with accompanying meteor streams would be comparable with that of the nebula itself. Thus the theory to which we are conducted, and which must be boldly enunciated, is that nebulæ are, as has so often been asserted, worlds in course of formation, and that comets are the active agents in producing this result, a theory which it seems at present hopeless to establish, but which the generally received doctrines of evolution may induce us by analogy to view with favour. It is worthy of consideration that, with one important exception, oxygen,* the substances which would exist in a nebula after the impact of a number of comets, are precisely those which are the principal constituents of an organic world; but it would be idle to speculate upon the actual result of the union of comet with nebula until spectroscopic science shall have informed us what are the two other substances that we find so plentifully in the heavenly bodies, namely, the third constituent of the nebulæ, and the so frequent component of comets. As the nebulous matter became more and more dense, its gravitational attraction would increase, and the number of comets drawn into its toils would for some time increase also, but as the system became developed, and the central mass assumed the liquid form, they would be enabled to escape after having described their orbits around the newly formed sun, leaving only the lesser and outlying meteorites to swell its mass and maintain its heat, precisely as happens, in all probability, in our own system.

Orwell Park Observatory.

(*To be continued.*)

ONLY A SPARROW.

THREE years since last June, an unfortunate sparrow fell at my feet from the roof of a house as I was passing. The miserable little creature was quite unfledged, and somewhat bruised by its rude contact with the "bare flint stones." Taking compassion, therefore, on this "waif and stray" of misfortune, I carried it to my house, and there confided it to the care of one of my servants. With motherly forethought, she swathed the bantling in cotton wool and flannel, and for safety, consigned it to a cage. Every now and then she took the helpless orphan out, and administered to it a "judicious quantity" of sopped bread from her own mouth. The bantling took to its foster-mother and to its diet kindly, and by slow degrees acquired the

* The unidentified line in the nebula spectrum is very near an important line in the spectrum of oxygen, but the coincidence is not exact, as in the cases of the hydrogen and nitrogen lines, nor have experiments been made upon the last line to disappear in the oxygen spectrum when the source of light is made gradually fainter, as in the case of the other two gases.

full stature and dimensions of a well-to-do house-sparrow. The anxious inquiry then arose—what to do with it? To keep it in confinement would have been both useless and cruel. It was then determined to place its cage on the ground, leaving the door open, that it might go in and out at its pleasure. Although there were very many sparrows in the garden, none deigned to notice the forlorn one, save another of about the same age. This for several days was employed evidently in teaching the "adopted" how to make its entry into the busy world, and singularly enough, having done so, it suddenly died. After a while our nursling finally deserted its cage, and took upon itself the duties and responsibilities of sparrow life. But to this day it remembers her who so carefully tended it. If my servant is in the garden, the little creature will at once fly to her, perch on her head or shoulder, and eagerly eat from her mouth, retain_taining its position when she is walking or gathering flowers or the like. It is perfectly at home with all the household; and if I hold a small piece of bread between my lips, it will fly a distance of many yards, and without erring, take it from my mouth. For the general amusement I have had a small pane in the window of the kitchen hinged, for the admission of our now interesting pet. With the time of the meals it is perfectly acquainted, and does not fail at breakfast, dinner, and tea, to announce its presence, by knocking with its beak at the window until it is opened for its entry. It then perches upon the shoulder of its foster-mother, and is fed as usual from her mouth. During the interval of more than three years, it has reared several broods of now well-to-do and respectable sparrows. On one of these occasions the number of its visits to the food left for it at its window in the kitchen, was no less than 237 in one day. During the recent season the little creature has reared *two* broods, and it appeared to encourage omnivorous appetites in its progeny. One day it eagerly seized a large prawn which was on a plate, and forthwith bore it off in triumph to its nest. A full-sized moth was treated in the like manner, and an unsuspecting wood-louse was ruthlessly pounced upon. Only a sparrow! Two hundred and thirty-seven visits in one day, and probably many more, to procure food for its young. Beautiful obedience to a marvellous instinct. Only a sparrow! In our gardens it is looked on as a pest, and has to creep here and there to escape persecution.

Sidmouth. N. S. Heineker.

Pike.—A pike was caught in the Isis a short time since, weighing about 2 lb., and, singular to say, was in the act of gorging a relation which weighed $1\frac{1}{2}$ lb.—*W. H. Warner.*

THE ANATOMY OF A CATERPILLAR.

The accompanying figure represents half the interior of a caterpillar when cut open. Only half is given, so as to prevent confusion. The interior will be first explained, and then the details of the outside surface. The dark space in the centre, marked A A, represents the digestive apparatus, consisting of throat, stomach, the intestines, &c. Along the centre of the digestive apparatus is the nervous system, analogous to the human brain; it is marked by dark lines in the cut. At different portions there are large protuberances called the *ganglia*. These form centres to carry smaller

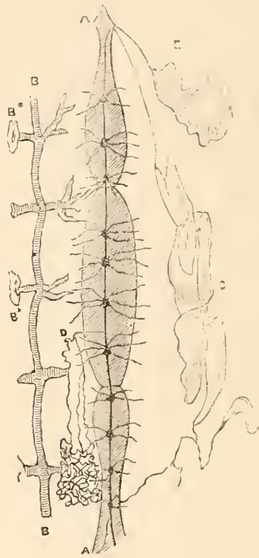

Fig. 170. Anatomy of a Caterpillar; A A, digestive apparatus; B B, trachea; C, silk gland; D, liver; E, salivary gland.

nerves to different parts of the body. If these nerves are examined by the microscope, they will be found to consist of two tubes lying side by side. If the head of an insect is cut off, it lives a long time, because of the brain extending through the entire length of the system. On the right hand there is a curious, twisted organ marked C. This contains the silk with which the caterpillar constructs its cocoon. If this organ is opened, there is seen a curious kind of gum, partly tough and partly brittle. This substance is worked through the small tubes at the end of the organ, and passes then to a smaller tube called the "spinneret," which opens in the mouth, from whence it issues in a fine thread. There being two of these organs leading to one spinneret, the good silk has a double thread instead of a single one, causing the silk to be stronger and better. Just before the time for spinning comes on, this organ is a great deal larger, and when the cocoon is completed, it diminishes altogether. At the left-hand side of the cut is seen a curious ringed structure, marked B B. These are the breathing-tubes or *trachea*. They extend through the whole insect, surrounding every organ contained in the system. They are formed of minute spiral tubes, which are made up of two threads overlapping each other. These tubes are connected with openings on the outside, called spiracles, B* B*, which are of various forms, and covered with hairs or quills, to keep dust, &c., out of the tubes, and thus prevent them from getting choked. The curious bag-shaped organ E contains the saliva which is required by insects more or less. There is one more organ I must mention—that is the liver (D). It is like a mass of scribbled lines between the digestive organs and the breathing-tubes, and well repays a microscopical examination. If the vital parts are removed, the muscles are then seen with which the caterpillar bends itself, &c. Having now studied the inside, we will take a microscopical glance at the outside. Some species are covered with hairs, which form beautiful microscopical objects. Caterpillars have two kinds of legs—two at the back called pro-legs. These are furnished with suckers, which enable them to hold on to anything. The others are simply a kind of claw. The eyes are compound—that is, they possess many lenses. The mouth is a very curious microscopical object. The anatomy of a caterpillar will amply repay the trouble of examining it, and a young student of zoology cannot do better than persevere in his attempts to thoroughly understand it.

W. TYLAR.

HOLIDAY RAMBLES.

NO. II.—BOTANIZING IN THE HIGHLANDS.

IT was not with expression of unmingled admiration at the generosity of the Duke of Athol that we paid the accustomed "bawbee" to the toll-keeper his grace places at Dunkeld Bridge. We were out botanizing, and of course every eligible place we came to seemed always to produce a notice to "trespassers to beware." It is not flattering to one's *amour propre* to be looked on with suspicion by some athletic keeper, who only sees a "plant" in your being so assiduously engaged in looking after weeds. So, to prevent any such rencontre, we obtained a guide at the porter's lodge to conduct us over the pretty grounds of the Duke of Athol, and for a time listened with that amount of pleasure always excited by hearing the recital of the professional guide's oft-told tale, till at length we noticed he was lame. We suggested rest; he acquiesced in the suggestion, and so we were left alone to wander by the banks of the Tay and pick such specimens as we could. The sides were purple with the *Geranium sylvaticum*, and the *Geum rivale* was also abundant; then the yellow flowers of the *Solidago virgaurea* and *Hieracium murorum* were growing among the rocks, while the hill-side was covered with the *Veronica officinalis*, *Potentilla tormentilla*, *Galium saxatile*, and *Blechnum boreale*. By the water-edge the pretty *Spirea salicifolia* was found, and under shady trees we came across *Symphytum tuberosum* and *Asplenium trichomanes*. Then came a walk (properly guided) through the garden, by sweet magnolias, showy rhododendrons, gigantic larches, and graceful pines; then out to Birnam station, and on past Pitlochrie to Killiecrankie station, whence it did not take long to get to the Glen. Climbing up by the burn-side we came to a bridge half covered with *Cystopteris fragilis*, the almost dried-up stream-side being thickly covered with *Aspidium filix mas* and *Asplenium filix femina*; higher up were *Aspidium oreopteris*, and on rocky walls the *A. trichomanes*, *Adiantum nigrum*, and *Ruta muraria*. On climbing up the rocks to the Soldier's Leap, we found the pretty *Vicia sylvatica* and the *Melampyrum* covered the ground in the greatest profusion. Under the railway bridge large plants of the *Symphytum officinale* (purple flowers) were found; then reappeared the *Geranium sylvatica* and *Geum rivale*; now a fine plant of *Carduus heterophyllus*, and then *Lathyrus macrorhizus*, were gathered. Shortly, as we came on spongy ground, the little *Drosera rotundifolia*, the pretty *Polygonum viviparum*, *Orchis latifolia*, and the graceful *Equisetum sylvaticum*, were noticed.

The view, looking up the glen towards Blair, is extremely picturesque, the well-wooded sides of the glen showing all tints of green, and the Garry, clear as hill-streams only are, tumbling over the rocks below, while the distant tops of the boggy Ben y Vroes, could be seen beyond Blair. The path kept winding along, revealing new prospects at every turn, and the beauty of the walk was still more intensified by the rich profusion of floral treasures. Under shady trees we found the wax-like flowers of *Pyrola minor*, and on rocks the *Antennaria dioica*. On the walk to Pitlochrie, by the less picturesque turnpike, we gathered the *Alchemilla vulgaris*, the oak and beech ferns, the odorous *Allium* and *Rosa villosa*. In corn-fields the *Galeopsis versicolor*, *Lycopsis arvensis*, *Chrysanthemum segetum*, and *Spergula arvensis* were very common, growing in inverse proportion to the wheat. At Pitlochrie we booked to Aberfeldy, and having put ourselves and plants in proper order at the Breadalbane, set out for a stroll to the Falls of Moness. We followed the tortuous path that leads by the stream, in wet soil finding the lovely *Trollius europeus*—a long-expected beauty—while under the dripping cliffs the *Chrysosplenium oppositifolium*, *Cardamine sylvalica*, *Hymenophyllum*, and *Melica* *nutans* were discovered. Hanging over precipitous rocks the *Stellaria nemorum* was growing.

Very pleasant was the homeward ramble, and it was no reluctant consent we gave to the offer to climb Weem Rock, about a mile distant. A stiff pull it was up the hill-side, and we were not a little surprised to find a house nearly at the top, with cultivated ground contiguous thereto; but we did not stay long to hazard hypotheses about the occurrence of that habitation, or the means of ascent to or descent from that abode. More inviting was the prospect over Aberfeldy, and down by Weem towards Kenmore. We watched the day fade through twilight to night, in the dim indistinctness of which a silvery sheen was noticed over Kenmore, which we said was Loch Tay, and over that Strath the evening's mists were solemnly stealing. G. C. Druce.

EXOTIC SEAWEED AT DEVONPORT.

In former numbers of this journal, I have had the pleasure of calling attention to certain peculiarities in the appearance and disappearance of some species of marine algæ, of the occurrence of doubtful native species, and, in *one* case at least, of the disappearance of an alga from Torbay (its only recorded British habitat), which for years I have sought in vain, and, as I have already observed, has either receded from shallow into deep water, or, for the present at least, is lost to our marine flora—I refer to the rare rhodosperm, *Gigartina Teedii.*

I am about to describe a very remarkable plant ndeed, not by any means beautiful and attractive, but curious and interesting. Curious, because it bears, in outward appearance at least, some little resemblance to one of our native species; but peculiarly interesting, since I feel tolerably sure that it is not a British alga at all, although the specimen, which has recently been sent to me for examination, was found on a mud-bank at Tor Point, near Devonport, not cast ashore nor solitary, but growing, attached by its hard, clasping root, with several British rhodosperms, to a substance which was fixed on the bank.

My informant, who is a collector of seaweeds, but is not an algologist, described the finding of it thus: "I was in a boat looking for seaweeds, and as you told me I should find a variety of species at Tor Point and all about in that direction, I told the boatman to row up to Tor Point and to land me if he could. Well, I got out of the boat and walked about as well as I could, considering the dirty place I found it to be, and among other things, I found quite a handful of a long, thick, greenish-olive plant, which appeared to me like one of the branching sponges or the green seaweed called *Codium tomentosum* or *Mesogloia vermicularis.* I had never seen anything exactly like it, and I asked the boatman what he thought of it, and he replied, 'I don't know what to make on it, but it's a seaweed, I s'pose.' When I found the plant, it was firmly fixed, evidently growing upon something two or three inches below the surface of the mud; however, I pulled it up and took it home and mounted two separate branches, wet and spongy as they were, and now I should be very much obliged to you to name it for me."

Upon inspecting this strange-looking plant or portion of a plant, I saw at once that it was either an abnormal form of *Codium* or *Mesogloia*, or, which I could scarcely think possible, a foreign species floated hither. My informant has since assured me that there was some difficulty in pulling the plant away from its point of attachment. This being so, the weed was evidently *growing* where it was found. Well, I have compared it with a whole suite of specimens of *Codium* and *Mesogloia*, and find that it agrees in structure with neither of these genera; though, I must observe, it comes rather near to the latter. So far as I have been able to make out from an examination of this pressed and dried specimen, I have come to the conclusion that it belongs to the family of the *Chordariaceæ*, the diagnosis of which is as follows: Olivaceous seaweeds, with a gelatinous or cartilaginous, rarely membranous, frond, composed of vertical and horizontal filaments or strings of cells interlaced together. Spores are attached to the filaments, and concealed within the substance of the frond. Closely allied to plants whose diagnosis is precisely in accordance with the above, is the foreign species, *Liebmannia Laveillei*, of Professor J. Agardh. This peculiar plant is a native of the Mediterranean, and is found also in the Adriatic. It occurs also on the coast of Mexico. There is also a species of the same genus found at Vera Cruz, and another, which Professor Harvey considered to be identical with it, on the Australian coast. I have seen a specimen of the Australian species, and I feel convinced that the curious plant I have been describing is to be referred to the same species. It has pretty nearly the habit of our *Mesogloia vermicularis* (which belongs to the *Chordarieæ*), but is firmer in substance, thicker and larger in its main branches, and, on being remoistened, recovers in a great measure its original form. The branches and upper divisions are flatter near the terminal portions, but a transverse section represents generally that of a compressed or flattened ellipse. The length of the plant is from one to two feet or more.

What, then, is to be said of the curious fact, that an undoubtedly foreign species of seaweed has been found actually growing on a muddy bank in a British harbour? There is no doubt whatever in my mind, that this plant is a specimen of *Liebmannia Laveillei*, and my friend Mrs. Merrifield, of Brighton to whom I have submitted it, has come to the same conclusion respecting it. I have written to one of my collecting acquaintances at Plymouth concerning this plant, directing attention to the spot on which it was found a month ago; and if I should be so fortunate as to receive some fresh specimens of it, I hope to be able to trace its history more completely than I have been capable of doing hitherto, although, as in the case of the Mediterranean species, *Polysiphonia divergens* (which was taken some years ago in Falmouth Harbour, and identified by Mrs. Merrifield), the curious Melanosperm I have described, has certainly been developed from spores which have been borne in currents from some foreign habitat, and vegetated in a similar situation here to that in which the parent plant has been growing.

W. H. Grattann.

THE GREAT NORTHERN DIVER.

Away amid the desolate solitude of the cliffs and headlands that shield the Western Hebrides from the inroads of the tempestuous Atlantic, there may occasionally be discerned, during the declining and colder portions of the year, a tall, gaunt, snowy-breasted sea-bird sitting erect upon the ledge of some wave-lashed rock. He sits there solitary, yet still not destitute of company; and the conspicuous whiteness of his breast contrasts strangely with the sombre aspect of the cliffs behind. He sits motionless, too, and apparently immersed in a "brown study"; but his keen bright eyes are all the while intently occupied in ministering to the comfort of number one. Perhaps he is not in his proper place. That may be, and indeed our conjecture is not altogether unsupported by fact; for after a little while, when appearances manifestly assume a favourable aspect, he darts with great grace and facility into the sea. He has traversed the watery regions with truly marvellous swiftness; for in the course of about two minutes he reappears about two hundred yards away from the point of ingress. The elongated yacht-like conformation of his body, conjoined with the powerful action of his short wings and suitably-placed feet, have proved valuable auxiliaries to him in the course of his aquatic excursion. Moreover, he is a very beautiful and exceedingly knowing-looking bird. Yet it may be asked, if our bird is capable of expending such a vast amount of physical energy as that now indicated, may not this valuable endowment be also utilized in some other mode or direction? Yes it may; for it is well known that our diver, except during the breeding season, is a constant frequenter of the open sea, where he is frequently to be seen hovering about in the vicinity of herring and sprat shoals, diving amongst them, and abstracting therefrom as much nutriment as suffices to renovate and sustain the immense physical force involved in his method of living.

It is chiefly, however, amid the vast solitudes of the Arctic regions that the Great Northern Diver is most frequently to be discerned. The coasts of Labrador, Iceland, and Spitzbergen are the particular localities where he loves to settle, especially during the breeding season, which occurs once in the year—generally in the summer. There they may readily be discovered, in company with a few co-mates, ranged in vast numbers along the shore, busily occupied in the pursuit wherewith their name is most intimately associated. As soon, however, as the southward career of the sun has permitted autumn to descend upon the temperate regions of the earth, the breeding duties having terminated, our bird emerges from his ice-bound home, and travels downwards till about the fifty-second degree of north latitude. During the autumn and winter months, he is frequently to be seen in the neighbourhood of the Faroe Islands, the Shetland, the Orkney, and the Western Islands, the coast of Sutherland, the Frith of Forth, &c. He is also commonly noted on the Irish, and even on the Welsh, coasts. According to the testimony, however, of some observers, he breeds on the Faroe Islands, and is to be seen there all the year round.

The bird now under review belongs to the highly interesting order entitled Natatores. Furthermore, it is enrolled in the genus *Colymbus*, belonging to the sub-family *Colymbinæ* of that order. The specific name is *glacialis*, which has probably been allotted to this bird on account of its association with the ice and snow of the polar regions. The genus *Colymbus* is broadly distinguished by the possession of short wings; broad, flat, compressed tarsi, which are placed so very far backwards that the animal always assumes a very erect position when standing thereon; and a strong, straight, rather compressed bill, pointed at the tip.

We shall now briefly indicate some of the principal external peculiarities whereon the *specific* characteristics of our bird depend. These are as follows:—Beak, head, and neck of black colour, with the exception of two crescent-shaped rings of white, streaked with longitudinal black bands (one situated immediately beneath the head; the other at the lower end of the neck); the general colour of the breast is a pure white, but there are a number of vertical black lines on the upper portion thereof. The colour of the back, tail, legs, and feet, on the other hand, is black or nearly so, with the exception of white spots on the following parts; viz.—On the broad back itself, where, however, the spots are very small (as also on the wing-coverts, rump, and upper tail-coverts); the scapulars and tertials have *large* white square spots—the latter feathers also ending in white. The total length of the bird is from thirty to thirty-three inches.

Having terminated our minute specification of the most remarkable features appertaining to the Great Northern Diver, we now proceed to enumerate and discuss three most important particulars that present themselves to view upon the contemplation of the habits, mode of living, &c., of this bird.

(1.) It is an able and dexterous diver. With respect to this circumstance, it may be observed, that the sharp, conical bill, succeeded by the comparatively narrow and elongated neck and body, conjoined with the short wings and suitably-placed web feet, must powerfully contribute to the production thereof. The immense expanse of chest probably also enables the bird to take a deep breath immediately before diving, so as to obviate the possibility of suffocation while traversing the watery regions. Moreover, it is worthy of observation that the outline of its body is not (like the sea-swallow, frigate-bird, &c.) broken up or diversified by outlying feathers, but presents a smooth and well-rounded surface to the spectator's eye.

(2.) It flies strongly and rapidly. The immensely developed sternum in the Great Northern Diver furnishes a steadfast fulcrum for the attachment of powerful muscles, which minister to the movements of the wings. Great power is thereby imparted to these instruments of progression, enabling the bird to battle effectively with the air. It must always be remembered, moreover, that the flying capabilities of a bird are most accurately measured by taking into consideration the power and extent of the particular muscles now specified, rather than by regarding the development of the wings alone. Thus, for example, although the sternum in such birds as the swallow, the swift, or the sand-martin, is not particularly remarkable in respect of size, yet the length, narrowness, and pointedness of the wings, conjoined with the lightness and hollowness of their bodies, insure an exceedingly rapid flight. On the other hand, the body of the Great Northern Diver is comparatively heavy, and the wings thereof short and broad. These disadvantages, however, are amply compensated for by the possession of an extensively developed breast-bone, which also (as aforesaid) furnishes valuable assistance in the operation of diving.

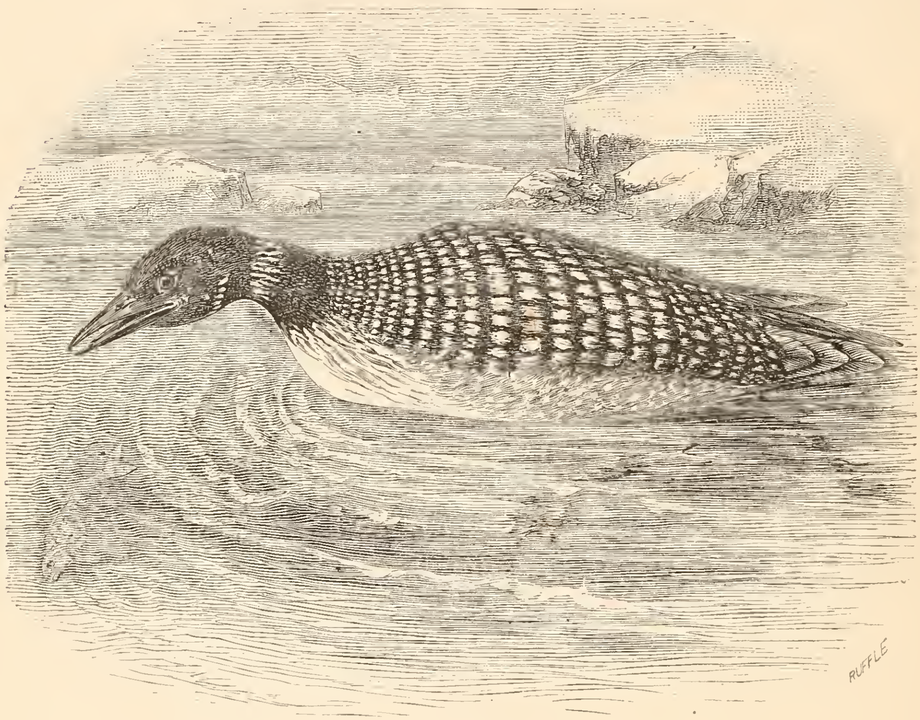

Fig. 171. Great Northern Diver (*Colymbus glacialis*).

(3.) Its home is in the Arctic regions. The powerful aërial apparatus indicated by the immense development of sternum in our bird is also invaluable in the way of generating a vast amount of animal heat. It is a fact well known to animal physiologists that the temperature of an animal's body is in direct proportion to the activity of its respiratory apparatus. Now, it is also familiarly known that the temperature of birds ranges remarkably high as compared with the mammalia. But to those birds which dwell in the frigid zone there would seem to be necessary an exceedingly efficacious heat-generating power, in order to sustain life amid the rigour of that terrible region. Such a state of circumstances, therefore, we may fairly assume to exist with respect to the Great Northern Diver, and, in short, generally throughout the order Natatores, since these birds, of all others, are most commonly observed to inhabit the colder quarters of the globe.

On the whole, therefore, from the foregoing observations it will readily be discovered that the Great Northern Diver exhibits many and diverse points of interest for the consideration of the comparative anatomist or physiologist. The bird is extremely interesting, moreover, from another point of view. Its cry is very peculiar and wild, recalling as an appropriate association the bleak and barren regions whence it comes. And as the twittering of a swallow heard in the morning is denominated beautiful by reason of its association with the cheerfulness of that sweet season, so does the cry and aspect of the Great Northern Diver forcibly suggest to us the wildness and desolation of the home whence it springs—characteristics well calculated to awaken peculiar emotions. P. Q. KEEGAN.

MORE ABOUT CARBONIFEROUS FISH.*

SOME time since, when sojourning in the neighbourhood of Leeds, my attention was drawn to an outlier of the coal-measures on Baildon Hill, an eminence a few miles distant from Bradford, the height of which is about nine hundred feet above the sea. On visiting this locality I discovered that the pit, which had been sunk for coal, had been abandoned, but the shale that had been brought to the surface had not been removed. This shale on being examined furnished me with remains of four fossil fish, two species of *Palæoniscus*, one species of *Cœlacanthus*, and one of *Acanthodes*, which I will briefly describe, as some of the readers of SCIENCE-GOSSIP may be interested in the extinct forms of life met with in the shales of the coal-measures.

The genera just mentioned all belong to one of Agassiz's great divisions of fish *the Ganoids*, which have again been recently divided into the *Lepidoganoids* and the *Placoganoids*.* The former of these sub-orders is represented by the *Lepidosteus*, or Gar-pike of North America, whilst the latter is represented by the Sturgeon. Again, the fish contained in the former sub-order had their bodies covered with scales of a moderate size, and their

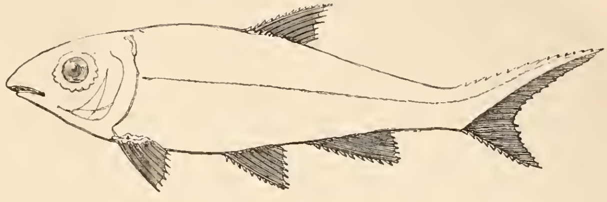

Fig. 172. Fossil Carboniferous Fish (*Palæoniscus*), restored.

skeletons were more or less perfectly ossified, whilst those comprised in the latter had their

Fig. 173. Fossil Carboniferous Fish (*Cœlacanthus*), restored.

skeletons imperfectly ossified, their heads and parts of their bodies being protected by large ganoid plates and scales.

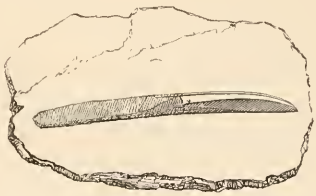

Fig. 174. Spine of Fossil Fish (*Acanthodes*).

Fig. 175. *a*, Scale of *Palæoniscus*, nat. size; *b*, ditto magnified.

The Lepidoganoids have been again divided into several sub-orders, in one of which, the *Lepidosteidæ*, the fish of the genus *Palæoniscus* have been placed. The members of this sub-order have rhomboidal scales, which do not overlap one another; and their

* SCIENCE-GOSSIP, 1872, p. 176.

* "Manual of Palæontology," by H. A. Nicholson, p. 322.

fins, which have large fulcral scales on their front margins, are paired but not lobed.

The fish that I am describing (fig. 172) (*Palæoniscus Egertoni* (?) is a small one, its length being about two inches and a half, and its depth seven lines. Its body is covered with small scales (fig. 175), which are covered with strongly defined and irregular ridges and furrows, the former terminating in sharp cusps on the hinder or free margins. It is remarkable for the large and flowing form of the dorsal and anal fins, the former of which contains about twenty-five rays, of which the four or five hinder ones increase in length in succession from before, forming an ornamental border to the fin. The upper lobe of the tail is remarkably long and attenuated, and is covered with small scales to its extremity.

Fig. 176. Scale of *Cœlacanthus lepturus*; *a*, nat. size; *b*, ditto magnified.

Associated with the scales of *Palæoniscus* I found a scale of *Cœlacanthus tepturus* (fig. 176). This fish is a Lepidoganoid, but belongs to another sub-order, the *Crassopterygidæ*, the members of which are distinguished by having hollow fin-spines, two dorsal fins, each supported by a single interspinous bone, cycloid* overlapping scales, two jugular plates, and by the remarkable peculiarity of the swim-bladder being ossified. I have also found this fossil in the Derbyshire coal-measures.

The third fossil mentioned, *Acanthodes*, also belongs to the same order as the preceding ones, but has been placed in the sub-order *Acanthodidæ*. This fish was covered with small shagreen-like scales, and was armed with strong spines simply implanted in the flesh (fig. 174) at the front of each fin, of which it had four; viz., one dorsal, one pectoral, one ventral, and one anal: it had also a heterocercal tail. Moreover, it had not any distinctly ossified cranial bones, and no operculum.

Such is a brief description of three of the fishes that roamed in the waters of the Carboniferous age. On a future occasion I hope to return to the subject, and describe other forms of piscatory life that illustrate the wisdom and benevolence of the Creator.

Rev. W. H. Painter.

Derby.

* Cycloid scales consist of thin, flexible, horny plates, circular or elliptical in shape, and have a more or less completely smooth outline.

FROST PHENOMENA.

During a recent hoar frost I observed the following rather curious phenomena.

It was a perfectly calm morning; even the light twigs of the birch hung motionless. It must have been as calm all night, for the frost-crystals stood thick on every spray, and many of them were half an inch in length. The world at midsummer is not more beautiful than on such a morning. But it struck me as remarkable that all these crystals pointed in one direction, nearly south-east. The south-east side of every twig on tree or hedge, of every brown bent in the pastures, of every blade of grass by the way-side, was fringed as with the teeth of an ivory comb, while the north-west side was entirely bare and dark. It looked as if a north-west wind had been blowing and had driven them all before it. But there was no wind at all; had there been any, the whole fairy fretwork would have been shaken to the ground. By means of that delicate anemometer, a wetted finger, I found, however, that there was the slightest possible air-current *from the south-east*, and a moment's thought showed clearly that such crystals must always face the current. They are built up by the successive congelation of minute particles of water floating in the air. If the air is absolutely quiescent these particles will slowly fall towards the earth and the frost-crystals will stand erect. If there is a slight current the particles of water will be carried by the current, laid one by one on the points of the incipient crystals, and freezing instantly will build them up in the very teeth of the stream.

Coming to a level crossing over a railway, I noticed a peculiar twinkling of light among the telegraph wires. There were three wires,—two above at equal heights and one below. They were all regularly fringed with frost-crystals on one side, and I could see them for a quarter of a mile down the line.

The twinkling light was caused by a very slight motion of the two upper wires; the lower wire was perfectly at rest. I asked myself, what could cause the motion of the two upper wires without moving the third? The tension of all three appeared to be about equal. The motion was not confined to a single interspace between two posts; it extended uniformly, as far as I could see, and the lower one was everywhere at rest. It was not a lateral vibration, either perpendicular or horizontal, but a partial rotation on the longitudinal axis of the wire. I watched it for about ten minutes. It continued with uniform velocity during the whole time, and was unaltered when I left. The are described by the points of the frost-crystals appeared to me to be not more that 45°, and if the points were half an inch from the centre of the wire this arc would represent a space of only ⅜ths of an inch, while the motion on the surface of the wire would scarcely exceed ⅛th of an inch. Supposing that the frost-crystals had not been there, would the motion of the dark wire have been perceptible at all? It is doubtful, I think. Were the two upper wires conveying messages at the time, and does the electric current cause a rotatory vibration in the wires, too slight to be noticed except under such special conditions?

Perhaps some electrician will answer this question. FREDERICK T. MOTT.

Leicester.

MICROSCOPY.

THE ROYAL MICROSCOPICAL SOCIETY'S "UNIVERSAL SCREW" FOR OBJECT-GLASSES, &c.—There is a general complaint amongst microscopists respecting the "so-called" universal screw. I have myself felt great annoyance when finding that the screw is *not* universal. Some of my friends' object-glasses (having the "universal screw") do not screw home in the nose-piece of one of my microscopes, while others fit loosely the nose-piece of my other instrument, although both microscopes have been supplied by the makers with the so-called "universal screw"! Moreover, I have seen modern object-glasses (manufactured since the introduction of the universal screw) by one of the leading opticians, having different gauges of universal screw, and by another not only object-glasses but adapted for analyzers, Brooke's nose-pieces, &c. When using high powers with a microscope having a concentric rotating stage (which is now considered almost a necessary addition) these variations of gauge render the stage eccentric, and no doubt very often the rotation of a stage is condemned, and the workmanship considered imperfect, when the fault lies in the inaccuracy of the so-called universal screw of either the object-glass or of the microscope's nose-piece, and frequently of both. I am quite aware that the smallest particle of dust in the object-glass screw will cause eccentricity, but this drawback is not a permanent one; it is bad enough to have it when it occurs—there is no necessity to make eccentricity both a feature and a fixture! With an universal screw, if we could not get in every instance perfect concentricity when rotating the stage, we should certainly approach it much nearer than we do now; of course accurate workmanship being always taken for granted. Besides the above inconveniences, there is another—the great difficulty and trouble in centring achromatic condensers of large angle of aperture with high powers, by different makers, having different universal screws. The Royal Microscopical Society have undoubtedly conferred a great boon upon microscopists by introducing the present "universal screw"; but could not an effort be made to render the screw really universal by causing the Royal Microscopical Society's *gauge* to be adopted by *all* the London opticians? Some technical and practical reasons may be adduced as to the difficulty of making universally true the "universal screw"; but, even admitting the next to impossibility of such an accuracy, why then call the screw *universal* when in reality nearly each maker of microscopes in London has his own gauge of the "universal screw"? It would be also a great convenience to have an universal gauge for the sub-stage fittings, eye-pieces, &c., so that the apparatus of any one maker should fit the microscopes of the others. At present there is a great discrepancy in the diameter and length of microscope-tubes and the gauge of sub-stage fittings, of some makers, compared with those of others. Why not make these also *universal?*—*A. de Souza Guimaraens.*

LEAVES OF VEGETABLE MARROWS.—The surfaces of the older leaves of this plant (*Curcurbita ovifera*) are studded with siliceous hairs, or prickles, at the base of each of which is a bead-like circlet of white bodies. When viewed with an inch or half-inch objective, with strong light, they come out well. They are better shown when the leaves have been well dried, and they can then be plainly felt by the fingers.—*J. E. T.*

AMŒBÆ.—I have found large numbers of this animalcule in some yeast, evidently living under the same conditions. They feed on the yeast *torula.* Two or three could be seen enclosed in the *Amœba* at one time. They varied in size, but increased and moved about freely. I am at a loss to account for their being found in such a situation. They were taken from fermenting beer.—*J. Abbott.*

COLOURING MATTER OF NEOTTIA NIDUS-AVIS.—M. Prillieux has recently contributed a memoir on this subject. He states that nearly all phanerogamic plants in which chlorophyll is absent are parasites; *Neottia nidus-avis,* however, is an exception to the rule. The brown of its petals is due to minute crystalline spangles, mostly stone-coloured, about ten to fifteen thousandths of a millimètre in length (sphæraphides?) When the leaves are treated with alcohol, ether, benzine, and alkalies, or boiling water, a *green* colour is developed. If a liquid capable of dissolving chlorophyll is used, a green solution is obtained, which gives the characteristic chlorophyll absorption-spectrum. The chlorophyll does not pre-exist as such, but is apparently produced by the alteration of the above-mentioned crystalline bodies.

Examining Micro-fungi.—I have had the good ortune to meet with a considerable gathering of that rare and interesting Micro-fungus *Xenodochus carbonarius*, and intend to refer to it in your exchange column. In the mean time allow me to say, for the information of beginners in this department of microscopic study, that the best way of examining temporarily this and other smuts or brands, is to place a small portion in water on a glass slide, and try the various powers, always beginning with the lower ones.—*T. Brittain.*

Fixing Diatoms.—I have found out a better plan for fixing diatoms since I wrote the article inserted in last month's Science-Gossip. The plan is as follows:—Place the frustules in the centre of the slide in a very minute drop of very thin balsam. Then hold the slide over the lamp till the balsam smokes. Then arrange the diatoms with a hair before the balsam stiffens. Let it cool, put the cover on, let the balsam run in, and then bake. This plan does not do for devices, but for ordinary slides of selected diatoms it will give great satisfaction.—*J. K. Jackson.*

Staining Vegetable Tissues.—In a paper by C. Johnson, M.D., Baltimore, U. S. A. (published in the *Monthly Microscopical Journal*, vol. xii., p. 184), the following directions are given for preparing a lilac or violet stain for vegetable sections and tissues:—"Ordinary logwood extract is finely pulverized in a mortar, and about three times its bulk of alum (in powder) added; the two ingredients are well rubbed up together, and mixed with a small quantity of distilled water. The complete admixture of the alum and hæmatoxylin is necessary, and this will require fifteen to twenty minutes' vigorous trituration. More water may now be poured on, and the solution, after filtration, should present a clear, somewhat dark, violet colour. If a dirty red be obtained, more alum must be incorporated, and the mixture again filtered. After standing several days, add 75 per cent. of alcohol, in the proportion of two drachms to one ounce of fluid. This fluid colours very rapidly, requiring but a few minutes; but if a slower tinting is required, the fluid may be diluted with a mixture of one part alcohol and three parts water. Before staining, it is necessary to destroy any colour that may previously exist in the sections, &c., to be stained. This, in the case of sections, may be done by soaking in strong alcohol; for thin leaves and fresh green sections the bleaching is to be accomplished through the agency of Labarraque's solution of chlorinated soda, in which the objects ought to be macerated until perfectly achromatic and transparent. They should then be transferred to distilled water for an hour or two, and afterwards soaked in a three per cent. aqueous solution of alum, and then transferred to the strong solution."

Cymbella Ehrenbergii, &c.—The improvements made in the resolving power of objectives led to the discovery of delicate markings on many species of Diatomaceæ, which the earlier microscopists supposed to be "smooth." To resolve these delicate markings they must have a large angular aperture, and light of more or less obliquity is required. Those forms with coarse lines not requiring these adjuncts were easily resolved by very imperfect objectives which did not admit of the use of an oblique pencil of light. As oblique light was not necessary for the resolution of these coarse lines or costæ, it does not seem to have been used upon those forms possessing them. Some years ago I called attention to the fact that if the costæ of *Pinnularia peregrina* were examined with a high power (one-eighth) and oblique light, a series of fine lines would be found crossing them in a transverse direction. I have since examined many other forms with continuous lines or costæ, and in several cases have been able to detect finer lines upon them; and I would particularly call attention to the costæ or *Synedra robusta* and *Cymbella Ehrenbergii.* If a valve of either of these forms is examined by oblique light, the coarse, rib-like line will be found to be composed of a series of compressed beads, reminding one of a row of peas in a well-filled pea-pod; the lines on *S. robusta* are more difficult of resolution than those on *C. Ehrenbergii.* I may perhaps remark that other species of the genus Cymbella show similar markings. I have not hitherto been able to detect any markings on *Pinnularia nobilis*, *P. major*, *P. cardinalis*, or *P. alpina.* On *P. cyprinus* there appeared faint traces of transverse lines.—I may here correct an error in my paper on the Diatom Frustule (No. 117, September 1, 1874). Fig. 135 is a section of *Surirella*, and fig. 136 a section of *Nitzschia.*—*F. Kitton.*

Chlorophyl in Spongilla.—Mr. Sorby, F.R.S., and E. Ray Lankester, have been recently investigating this subject. In the last number of the *Quarterly Journal of Microscopical Science*, the latter states, as the result of recent examinations, that he found among the amœbiform sponge particles of a green-coloured specimen of *Spongilla*, some composed of naked, colourless protoplasm, throwing out absolutely hyaline lobose pseudopodia. The outline of the nucleus is not strongly marked, but the nucleolus is obvious enough. In others were two, three, or four, or a crowd of even twenty green-coloured granules, of a uniform size and peculiar form, being concavo-convex discs or cups. The usual colour of *Spongilla* is a pale salmon. It might be suggested that the green granules (the chlorophyl-bearers) are parasitic, as has been suggested in the case of the starch-bearing yellow cells of *Radiolaria.* In the colourless *Spongilla*, however, sponge-cells are found which contain *colourless* granules, corresponding to the green-coloured granules of the green sponge particles. These are less definite in their form than the other. It has been found that in the orchid *Neottia*, where chlorophyl is absent, a green colour may be developed by the action of strong sulphuric acid, and Mr. Lankester has fouud that the same thing is true of the colourless specimens of *Spongilla fluviatilis*. In the latter the green is fully as intense as in naturally green specimens. He thinks the colourless parts are those which first turn green, though after the reagent has acted, the whole mass of coagulated sponge-sarcode is uniformly impregnated with a green colour. Mr. Lankester has heard that *Spongilla* contains a starch-like body, and asks whether this is so. Perhaps some of our microscopical readers may assist in this matter. Anyhow, the above observations tend to show that chlorophyl iu *Spongilla*, as in the higher plauts, is preceded by a distinct chlorophyl-evolving substance, which is colourless.

ZOOLOGY.

"Songs of Fishes."—A learned and highly readable article on this subject, by Mr. John C. Galton, F.L.S., appears iu the last number of the *Popular Science Review*. Two other articles in this capital magazine are worth careful perusal—"The Thermometer as a Companiou in Daily Life," by Professor A. H. Garrod, one of our most promising young uaturalists; and another, on "The Vegetable Cell," by Mr. A. W. Bennett, the well-kuown botanist.

Spiders' Webs and Spinnerets.—Since the above article was sent, a further examination of a *Ciniflo's* web leads me to think that I have fallen iuto error when describing it, from the bad habit of "jumpiug to conclusions." Under my highest power (a quarter-inch) the fourth threads of a Ciniflo's web present the appearance of being composed of a multitude of threads, as I have stated, which they also do with a power of 320 diams., but on increasing the magnification to 750, this appearauce vauishes, and they, *i.e.* the "film," looks as if it were simply mucus. A few days ago I stained some of the web with mageuta, and the examination of these stained specimens with a quarter-inch objective coufirms me in the idea that the film is uothing but mucus, though I am not yet sure that this is the case. I hope soou to have another opportunity of examining my slides with a power of 750, which I think, uow that I have stained the threads, will settle the poiut. Figs. 120 and 122 are both magnified 160 diameters: this was uot stated in the foot-note.—*H. J. M. Underhill, Oxford.*

Spiders' Webs and Spinnerets.—As I have the pleasure of knowing Mr. John Blackwall, the eminent arachnologist, I sent him last month's uumber of Science-Gossip, containing Mr. Underhill's paper on the "Spinnerets of Ciniflo." I examined this object some years ago, when visiting Mr. Blackwall, and was fortuuate enough to see it as Mr. Underhill describes it, except that I distinctly saw the extra pair of spiuuers covered with *papillæ* aud not *holes*. Mr. Blackwall saw them also, and I enclose a letter I received from him on the subject.—*W. Statham.*

The September number of Science-Gossip which accompanied your kind letter came safely to hand, and I am much obliged to you for it. Mr. Underhill's concluding part of the article on "Spiders' Webs and Spiuuerets" is especially iuteresting as supplying additional evidence, based on anatomical details, of the soundness of my views relative to the fourth pair of spiuuers,—calamistrum, aud snare of *Ciniflo atrox*, derived from careful observation and experimeut, and confirmed by the inspection of these structures under your powerful microscope. This is highly satisfactory, as the correctness of my statements in connectiou with these subjects has been called in question both by native and continental zoologists. The nomenclature adopted by Mr. Underhill differs somewhat from that employed by me; the parts termed 'spinnerets' by him I name 'spinners' or 'spinuing mammulæ,' aud the delicate tubes from which the viscid secretion that forms the lines of spiders proceeds, the 'spinuing-tubes' or 'spinnerets.' Mr. Underhill is certainly mistakeu in supposiug that the fourth pair of spinuers are not provided with spinning-tubes, but are merely perforated; aud he is also iu error in thinking that the lines constituting what I denominate the *flocculi*, are spun at the same time as the fouudation-lines to which they are attached; this, however, is not surprising, as he admits that he has never seen the spider use its calamistrum. I should much like to know what he says of the snares of the *Epeïræ* or geometric spiders.—*John Blackwall.*

Changes of Skin in Caterpillars.—Those who have reared caterpillars from the egg to maturity are well acquainted with the fact that they pass through various changes of skin, called scieutifically the ecdyses of these insects. It is a matter of some interest; and in regard to which I should be glad to elicit the opiniou of others, who have had opportuuities of observiug many species; whether the number of these chauges is fixed and invariable in each. As is pretty well kuowu by entomologists, hairy larvæ undergo more frequent chauges; in some species they reach the number of seveu or eight. Three or four changes of skin appear to be about the average with the bulk of the smooth larvæ, excepting, of course, those that are internal feeders or miners, with regard to which we are rather in ignorance. That the familiar silkworm (*Bombyx mori*) casts its skin thrice, is certain; and various as have been the records giving details of its life-history, I am not aware that any breeder of silkworms has found the number of changes more or less, however the insect might be reared. Yet the idea has been thrown out, that in the case of some Lepidoptera at least, a short or abundant supply of food, or a high or low temperature, may have an influence in producing more or fewer changes of skin during the larval life. If not, indeed, one is obliged to suppose some carelessness on the part of observers, since published accounts vary. The Puss Moth, for example, is said by some to cast its skin thrice; others state that the number of changes is four; the latter has been given as the number in *Bombyx pernyi*, though in caterpillars that I have just reared belonging to that species, there were but three. It is rather astonishing, also, to read that Mr. Newman fed up a caterpillar of the Poplar Hawk-moth, and never saw it cast its skin at all. It should be added, that as far as my experience has gone (a not very extensive one) in caterpillar rearing, I have noticed a uniformity in ecdysis in the species that I have had from the egg.—*J. R. S. C.*

How the Puffin ascends to its Nest.—In the September number of *The Zoologist*, Mr. H. M. Wallis has a short note on the above subject. He says:—Considering its habits, the Puffin, in comparison with most birds building on heights, seems somewhat insufficiently provided with the means of getting to its nest. How it contrived during the breeding season to make the frequent ascents necessary whilst feeding its young, was a question to me, until a short visit to Flamborough Head in June last explained the process. On the cliffs north of the lighthouse numerous guillemots and puffins were nesting. The latter chose the lower cliffs, and, from their boldness, their actions were easily watched both from above and below. Their manner of ascending to their nests, which were from 50 to 100 feet from the sea, was as follows:—The bird rose from the water some way from the shore, flying so as barely to clear the tops of the waves until within fifty yards from the cliffs, when it appeared to depress its tail, which was fully spread, and by extending its webbed feet on either side to nearly double the surface of resistance, its course was changed, and the bird rose without any apparent difficulty to its nest. Whilst thus used, the legs were laid along the sides, the inner toe of the extended foot was covered by the outer feathers of the tail, the points of the toes did not project beyond the curve formed by the tips of the tail-feathers; the combined arrangement of feet and tail thus forming a short but very powerful instrument, broader in proportion than the tails of most birds at that distance from the body. The habit was common to all the puffins which I saw go to their nests, and I think the guillemots used their feet in a similar manner; whilst rising, the wings were moved with the same regularity as in horizontal flight. It is evident that the use of the tail and feet described must lessen the speed of flight, and the Puffin is not eminent for its flying powers. It seemed as if the bird were conscious that it must have plenty of "way" on it at the commencement of the rise, and approached the point at which it began to ascend at a great speed. It occurs to me that the weight of the Puffin's body must tell in its favour, if the bird ascends by the momentum gained in its level flight, driving it up an inclined plane of air. If the above explains the peculiar action of the feet described, it may account for the singularly short allowance of tail that many web-footed birds are favoured with.

Vibratory Motion of Gnats at Rest.—I have never read or heard an explanation of a fact in natural history which many of your readers must have witnessed sometimes; I allude to the singular vibratory motion exhibited by certain gnats when at rest on walls of outhouses, &c. It is as though they were suffering from some nervous affection which forbade their being still, the motion being a rapid approach to and retreat from the wall on which they rest, their long legs acting as springs. I have more than once excited this motion in gnats, previously motionless, by gently blowing upon them. That the vibratory motion which then commences is not due to the mere physical effect of the blowing is evident from the fact that it continues for some minutes afterwards, and that it is not caused by a draught acting upon the insect's body is certain, inasmuch as I have witnessed it in situations absolutely free from currents of air. Why then does the insect indulge in it? Some insects I know feign death to elude death from their enemies, but why an insect should apparently attract attention by rapid motion is by no means evident. The similarity of the movement with that seen in dead and *sucked-out* insects in a spider's web alone seems to me to supply a sort of clue. But then we must attribute too much instinct to the little gnat, surely! Perhaps some of your correspondents may offer a far more likely solution.—*Windsor Hambrough.*

The Pigmy Whale.—Dr. Hector writes from New Zealand, in the last number of the *Annals and Magazine of Natural History*, to say he has obtained the calf of this whale (*Neobalæna marginata*), two feet three inches in length. All the baleen is *in situ*, so that there is no mistake. The Doctor thinks the animal is not uncommon on the coasts of New Zealand, but it is rarely obtained, as it does not grow to a large size.

BOTANY.

Edelweiss.—There has been some mystery regarding this plant on account of the various notices referring to it by its German name only, and the readers of such notices being led to suppose it is only to be found near glaciers, where the accident happened to an unfortunate lady when in search of it from Pontresina, in the Engadine. It is the *Gnaphalium leontopodium*, Scopoli (*Leontopodium alpinum*, Decandolle), a plant not only of the Swiss Alps, but various parts of the Pyrenees, Dauphiné, &c., in mountain pastures, far away from glaciers, although, of course, it may be met with in pastures near them; it is, or was a few years back, tolerably abundant on the summit of the Dole, in the Jura mountains, above Geneva, and is not unfrequent in the Engadine, in a contrary direction to where the lady referred to sought it, though not far from it, but not near a glacier. It belongs to a genus of which we have many in England, known as "cudweeds." It is a very beautiful plant, remarkable for its dense clusters of flower-heads, surrounded by a kind of radiating general involucre of floral leaves, all densely clothed with a close white cotton, and is well known to all botanists accustomed to high alpine and mountain pastures. The gnaphaliums are closely allied to the Elichrysum, the gnaphalium of Linnæus, which is so often seen in the shops made into wreaths as votive offerings to the dead, common in France, and sometimes in England, in cemeteries, and is the *Gnaphalium citrinum* of Lamarck.—*T. B. W.*

F. vesca and P. fragaria.—Any observant lover of wild flowers may soon learn to distinguish *Fragaria v.* (which seldom flowers before May) from *Potentilla f.* (which is one of our earliest spring flowers, not unfrequently blooming in February and even January) by its much greener foliage, its more conspicuous starlike flowers, and its more erect habit. Botanists would, I suppose, be agreed in accepting the following characters as distinctive, in addition to the great generic difference of fruit:—*Fragaria v.*—Petals contiguous; leaves bright green above, with few silky hairs; nerves of leaflets sunk above; stem with runners. *Potentilla f.*—Petals smaller, not contiguous; leaves greyish green, densely covered with long silky hairs on both sides; nerves of leaflets not sunk above; flowering-branches weak, and less erect than in *Fragariá v.;* stem tufted, sometimes shortly creeping.—*W. M. Rogers.*

Varieties of Plants.—I enclose a curious specimen of what I suppose is *Angelica sylvestris.* Instead of five stamens and five petals, it has only two of each. The umbels are very irregular, several of the flowers standing on pedicels only, without any primary ray or umbellule. The flowers, too, instead of being all white or all light red, are some white and some dark red, and some a mixture of the two colours. There were no leaves to be seen. It is probably a monstrosity, and so not likely to reproduce its kind. Does not such a case prove conclusively that many of the so-called varieties of plants, especially of ferns, are mere chance productions?—*R. W.*

Rare Plants.—A meadow at Stainall, North Lancashire, assumes in April a dusky-brown hue from an abundance of the plant *Fritillaria Meleagris,* and about two miles from the above, in the township of Out Rawcliffe, another meadow is almost white in the month of May with the beautiful *Narcissus poeticus,* both of which habitats are far remote from any garden.—*James Pearson.*

Disappearance of Rare Plants.—Having lately returned from a short tour in Scotland, I can state from experience that many of the rare plants of the country are disappearing from their habitats, owing to the wholesale manner in which they are taken away. This remark applies more particularly to ferns, but is unfortunately true to a great extent in regard to phanerogamia also. Thus, for instance, I found it stated in an old number of the "Phytologist," that in certain specified localities near Braemar *Polystichum lonchitis* and *Asplenium viride* were abundant. This is certainly not the case now. They are I believe still to be had in *some* parts near there, but have all but entirely disappeared from the localities mentioned in the "Phytologist." The waiter at the hotel at Braemar told me he had frequently seen whole boxfulls of ferns sent away, and therefore it is no wonder they are now scarce. Even on Lochnagar (at least near the beaten track) *lonchitis* was exceedingly rare, and *Asplenium viride* I could not find anywhere. *Linnæa borealis* had also, so far as I could make out after a careful search, quite disappeared from the habitat assigned it in the aforesaid number of the "Phytologist." At the Botanical Garden at Edinburgh, I asked one of the curators whether there was any chance of my finding *Corallorrhiza innata* and *Linnæa borealis,* both which plants are stated in the "Flora of Edinburgh" to grow within ten miles of that town. He told me that there had already been that season a party of students to look for the *Corallorrhiza,* and as for the *Linnæa* it still grew in some parts of the Pentlands, but in very out-of-the-way parts. The result of all this wholesale destruction of plants is that many of our rarities are fast disappearing from the country altogether. At Braemar I found *Geranium sylvaticum, Oxyria reniformis, Polypodium dryopteris,* and *phegopteris* plentifully, as also *Arctostaphylos uva ursi.* On the ascent to Lochnagar I found *Betula nana, Juncus bifidus* (in abundance), *Azalea procumbens, Aspidium lonchitis* (rare), and, I believe, *Polypo-*

dium alpestre, &c.; but I can plainly see that at the present day those who wish to find rarities must go quite out of the beaten track.—*T. W.*

THE "TEA-TREE."—It is interesting to record that this autumn a tree of the above kind, at Lincoln, has produced a large number of berries, many of which have come to maturity. Some of these are now lying before me; they are in point of size intermediate between the fruit of the hawthorn and that of the dog-rose, and in colour they nearly approach the latter. I shall be glad to know if this ripening is really of so rare occurrence as has been stated.—*W., Oxford.*

A PLEA FOR OUR GRASSES.—I quite agree with the remarks of Mr. J. Harrison, in a late number of SCIENCE-GOSSIP, upon the subject of our native grasses. Considering their elegance and the ease with which they can be preserved, it seems to me most wonderful that they should be so much neglected. It surely cannot be on account of the difficulty attending upon their study; if so I would assure the student of our interesting Flora, that I have had pupils who have been exceedingly critical upon this tribe of plants simply by being introduced to them in field explorations; and with a little teaching we find that very young people can well appreciate their differences. My old agricultural class was always fond of them, as their practical teachings appeal with especial force to the farmer, as no other class of plants is so capable of teaching us the different qualities and capabilities of soils with equal exactitude.—*J. B., Bradford Abbas.*

PLANTS OF CASTLE EDEN DENE, DURHAM.—I frequently read with pleasure notes by the correspondents of SCIENCE-GOSSIP, telling of their visits to some particular locality in search of plants or insects, &c.; and I regret that there are not more of these: they give most valuable information to the entomologist and botanist, and frequently are the means of guiding him to favoured localities, which otherwise he might overlook, although in the immediate neighbourhood. To show what I mean, I will copy from my notes for the last week in July, memorandum of an excursion I made to Castle Eden Dene: it is situated about midway between Ferryhill and Hartlepool, is easily reached by railway, and has been long noted for its many botanical treasures. The most conspicuous plant, as we strolled in the upper parts of the Dene, was the elegant Hart's-tongue fern, growing in the greatest abundance by the road-side; the *Melica nutans* was plentiful, also the Lily of the Valley, the *Rubus saxatilis*, and the *Paris quadrifolia*, the latter two in fruit; in one spot we saw the *Cephalanthera ensifolia* in seed. By the wayside was the *Epipactis latifolia*, and in one place near the mouth of the Dene, *Epipactis palustris* in flower; in many parts the Hemp Agrimony (*Eupatorium cannabinum*), *Orchis conopsea*, and the Comfrey (*Symphytum officinale*). As we approached the wider parts of the Dene, near the sea, we found the *Geranium sangunieum*, and on the sea-banks the beautiful *Parnassia palustris* and the *Orchis pyramidalis.* There is a vague rumour that the rare Lady's Slipper (*C. calceolus*) is still to be found in the Dene, but as the time of flowering was long past, to search for it would have been a hopeless task. Another plant I searched for in vain, the sweet-scented and elegant *Pyrola rotundifolia*, although I examined well the spot where I had seen it growing in profusion some years ago; it had completely disappeared, the site being monopolized by the perennial Mercury and other dense-growing plants. The end of May or beginning of June would have been a much more favourable time to find most of these plants in their greatest perfection, and I certainly should recommend botanists to select that time to visit the Dene.—*T. I. B., Ferryhill, Durham.*

SUDDEN APPEARANCE OF PLANTS, &c.—I am able to confirm much which your correspondent Mr. Edwin Lees has communicated in your September number, and add my experience of the same. Some twelve or fourteen years since a new basin was formed in the river Lea, and the earth deposited on a waste piece of ground alongside, which produced the next year many of the varieties of *Chenopodium* and *Atriplex*, especially *C. rubrum, hybridum*, and *filicifolium*, whilst in the year following I could not find ten plants altogether. Again last year the other parts of the river were dredged, and the muddy gravel produced again quantities of *Chenopodium* and *Atriplex*, with *Nasturtium terrestre, Erysimum cheiranthoides, Saponaria vaccaria:* these have this year given way almost entirely to several of the *Polygonum, Sinapis, Camelina*, and grasses. The sand scraped from our roads has this year produced a large crop of *Camelina sativa* and *Linum usitatissimum.* When the branch line of the Great Northern Railway was cut from Hatfield to Hertford, *Centaurea calcitrapa* made its appearance the first year, and has not been seen since. *Scrophularia vernalis* also visited us six years ago with about twenty plants, and only one has been seen since, viz. last year.—*Robert G. Andrews.*

SUDDEN APPEARANCE OF PLANTS, &c.—In connection with the paper in last month's SCIENCE-GOSSIP, page 190, by Mr. Lees, on the above subject, I have noticed a curious circumstance respecting *Pyrola secunda* (serrate winter-green). I had known a patch of *Pyrola minor* for several years, and frequently seen the plants both in flower and in seed. One season I found intermixed with *minor* a few specimens of *P. secunda.* I could scarcely have overlooked them had they been there formerly. However, they grew and multiplied till in 1872 there were at least fifty individuals of this species. But the strange thing is that last year, and this year also, the *serrate* have all entirely disappeared. I cannot believe that any one meddled with them, nor has the soil at all been disturbed. *Minor* is still in abundance, but not one plant of *Secunda* is to be found. How are we to account for this?—*R. W.*

GEOLOGY.

The Lemming in Cave Deposits.—Professor Owen has communicated a note on this subject to the Royal Society. When his "British Fossil Mammals" was first published, this animal had not been found in England. Since then it has been found in lacustrine brick-earth at Salisbury, associated with remains of the mammoth. The supposed lemming from Brixham Cave, the Professor believes to be a *Pika*, a tailless hare, and not a lemming at all.

Fossil Oyster-Bed.—Your correspondent E. Lovett will probably find that the "recently-discovered" bed was noticed in 1872 in the "Memoirs of the Geological Survey," vol. iv. As, however, neither the exact locality nor the geological position of the bed is mentioned in his letter, I can but infer that the "bottom-bed" of the Woolwich and Reading Series is alluded to. This bed was laid open at Croydon, in 1869, and oyster-shells have been known to occur in it in other places for many years.—*W. W.*

The Geologists' Association.—This useful society, which has its head-quarters in University College, has just issued Parts 6 and 7 of its "Proceedings," in which are some capital papers by Samuel Sharp, F.G.S., on "The Geology of Northamptonshire"; and a very elaborate essay by the hon. secretary, Mr. W. H. Hudleston, F.G.S., on "The Yorkshire Oolites." The chief features of this association, however, are the periodical excursions (sometimes of several days' extent) which its members make to well-known fossiliferous localities, under the generous leadership of celebrated palæontologists and geologists. During the last summer, and that of the previous year, such excursions were made to Brighton, Hatfield, Plumstead, Cropness, and the Malvern district. The "Proceedings" are ably edited by J. L. Lobley, Esq., F.G.S.

Record of Geological Literature.—It has been decided to publish, as a yearly volume, a Record of works on Geology, Mineralogy, and Palæontology, British and Foreign. The first volume will be printed by the middle of 1875, and will contain short abstracts or notices of papers, books, maps, &c., published during the year 1874. It is estimated that this volume will contain from 200 to 300 pages, and that its price will be 10s. 6d. The editor of the volume is Mr. William Whitaker, B.A., F.G.S., of the Geological Survey, who is well known for his extensive acquaintance with geological literature. Among the gentlemen who are assisting in the work are Messrs. Carruthers, David Forbes, Prof. Geikie, Prof. Green, Prof. Rupert Jones, Rudler, E. T. Newton, Topley, Henry Woodward, and others. This work will be greatly helped if Provincial Societies and Field Clubs will forward copies of their publications to the editor. It is expected that the number of subscribers will cover the expenses; but if not, several well-known geologists have come forward as guarantors.

NOTES AND QUERIES.

A Natural History Field Club in London.—On referring to back numbers of the Science Gossip, I came across a short paragraph by Mr. James Britten, F.L.S., in which he regrets the want of a working "Naturalists' Field Club" in London, and expresses his readiness to help any that might be formed. If a few such well-known naturalists as himself were to start a society of the kind, I have every reason to believe they would meet with great success, and be conferring a real benefit on many. This want is but poorly supplied by the numerous Microscopical Clubs of the metropolis. The absence of that enthusiasm (so characteristic of the Country Field Clubs) keeps most of the really active workers from the periodical excursions made by the London clubs. I trust the matter may not be allowed to drop, and that Mr. Britten and others of the leading naturalists will take the matter in hand this winter, so that before next season a Naturalists' Field Club in London may be "*un fait accompli.*"—*James Groves.*

Snakes and Toads.—An American correspondent has told you that he once saw a snake eating a toad. As I was walking in the New Forest this summer, I saw what looked like a leafless bough, with a dead toad lying at the end of it. Upon approaching, I discovered it was a snake, in the act of swallowing a toad. The head of the latter was in the snake's mouth, from which the toad's body and legs stuck out quite stiffly. When I stooped over them, the snake quickly glided away, and left the toad half covered with thick saliva, and quite stupefied. I bathed the toad's head, and it slowly came to its senses, and at last crawled away.—*John Hugh Bertram Brooke, Stockwell.*

Do Fishes utter Sounds?—The other day I was out trawling, and amongst a number of fishes, such as soles, plaice, &c., was a common skate, about 18 inches in width. About half an hour after this latter fish was caught, I heard it utter a series of distinct squeak-like sounds. Several friends were with me at the time, and we were all astonished at the performance. I should be glad to know if any of your correspondents have met with a similar experience.—*C.P.O.*

Herring Gull.—Sitting at my window one day lately, I was much amused by watching the manœuvres of our tame sea-gull "Jack." What first attracted my attention was the steady way he stood beside an old barrel placed on its end in an outhouse. At first I could not think what he was at, until I remembered that the hens were in the habit of laying there, and I knew Jack's well-known weakness for eggs! Presently I heard a cackling, and out came a hen; upon which, Jack dived into the barrel and reappeared with an egg stuck on his long bill; but instead of at once *bolting* it, as I have seen him do with *two* at a time, he placed it on the ground and began to execute an Indian war-dance round it. Round and round he went, until I thought a case of "death of a sea-gull from blood to the head" would be the result, and he seemed so confident, I thought a "sell" would be good for him; so I called to my cook to take the egg, and continued to watch master Jack. No sooner was the egg removed than rage got the better of him. He screamed at his very loudest, and rushed about the yard as if he had but just escaped from an asylum for lunatic sea-gulls, until he suddenly espied another hen enter the barrel, upon which he took up his old station, this time watching the hen through a slit in the side, and pecking viciously at every live thing that came within reach. I could not wait to see if this time his patience was rewarded; but even though I should be the loser, I almost hope it was.—*L. A. Brenan, Pomeroy.*

Swallow-tail Butterflies on the Lion Mound at Waterloo.—Being advised by a non-entomological friend (who had some years ago seen some curious black and yellow butterflies on the Lion Mound at Waterloo), to take my net there, I was successful in taking three *Machaon* on September 1st. The day was fine but breezy, and the three I captured on the leeward side of the mound were all I saw in the locality. Is it not curious to find them in such a situation, miles away from any fens?—*H. A. K., Hayes, Kent.*

The Gooseberry-leaf Caterpillar.—There are few garden pests more easily got rid of than these caterpillars if taken in time. If "F. R." will adopt the following plan, he will neither lose a gooseberry or leaf. As the leaves unfold in April, the parent fly will deposit her eggs in the densest of the foliage, and the young caterpillars will give notice of their presence by eating away the underside of the leaf in little patches, giving it the appearance of being pierced with pinholes. Each of such leaves will produce 50 or 60 caterpillars or unhatched eggs, which may thus be destroyed in a moment. The search must be repeated during the month for fresh broods. The leaves are so easily detected that a couple of minutes for each bush is quite enough.—*A. W.*

Butomus umbellatus.—At the 147th meeting of the Leeds Naturalists' Field Club and Scientific Association, held Sept. 15, Mr. James Abbot mentioned that he had gathered this plant in flower at Kirkstall on the 12th Sept. The plant formerly grew in the small stream at the foot of Batty Wood, Woodhouse Ridge, but has not been known there, or in any part of the Leeds district, for upwards of twenty years.—*Wm. Denison Roebuck.*

Larva of Privet Hawkmoth.—About this time last year I obtained the larva of a privet hawkmoth, which, after a few days, changed into pupa. I placed some dry earth in an empty cigar-box, and put the pupa into it, covering it lightly with mould and dry leaves, giving, however, access to the air. The whole was placed in a dry cupboard in hope to see this year the imago; but there it is in the pupa state and still alive, for, when exposed to the sun or breathed upon, it will move. Can you or any of the readers of Science-Gossip suggest why it does not perform its metamorphosis into imago; and is this a common event?

Feline Oddities.—It may interest your correspondent to hear that we had for some time in the early part of this year, a pure white kitten with one eye a bright blue, and the other quite yellow. Her mother is a dark tabby cat, with one yellow and one black eye. The white kitten came to an untimely end in May last, being run over by a van in the road. She would never, under any circumstances, drink milk, nor, if she could help it, clean water; but would greedily lap soapy water in which one's hands had been washed, seeming to prefer this to any other drink.—*H.*

Aquaria.—I have not much more practical knowledge of these and their inmates than "Querist," but I have been a pretty diligent student of "Half-hours at the Seaside" during the past month or two, and would recommend him to procure that volume from the publisher of Science-Gossip for information about anemones and anemone collecting, and about other "things" whose habits can be watched in an aquarium. As to its management, "Querist" will find some hints in the number for May, p. 118; and he might also refer to the previous number, p. 95. One word of warning. Anemones do not like being torn from their beds (though these be of stone), any more than human beings do. "Querist" will therefore be wise to substitute the plan of knocking off the piece of rock to which the creature is attached, for the "pulling-off" process; by a little extra search he will often find some specimens located on fragments of rock small enough to carry home to his aquarium.—*W. R. H.*

A Feline Oddity.—I have seen a black and white cat, whose eyes were precisely similar to those described by "W. R. L." in Science-Gossip for August—one a yellowish grey, and the other a bright blue. Its tail, instead of being long, like an ordinary cat's, was stunted like a rabbit's. A kitten born in the same litter had eight legs, two tails, and four ears. It died at birth, and its owner has it preserved in spirits, and I have seen it.—*H. W.*

Trees springing out of inclosed Tombs.—I am inclined to think that the story mentioned by your correspondent "J. R. S. C." (Science-Gossip, No. 114, p. 143), with respect to the seven ash-trees springing from the inclosed grave in Tewin churchyard, was made to fit the circumstance of the appearance of the *seven* ashes. If the trees that appeared had been fewer than seven, probably no tale would have been invented respecting them. The story, if really worthy of consideration, should be traced to its originator, and the date of interment given, when perhaps some light could have been thrown upon the lady's history which might give colouring to the tale, or render it improbable. As to the appearance of ash or other trees within the space of inclosed graves in neglected churchyards, where families have died out or removed far away, it is not an uncommon circumstance. To go no farther than Perivale, Middlesex, when I was last in the churchyard there, I made a sketch of an altar-tomb surrounded by iron railing, within which several self-sown trees had got, and quite embowered the tomb with a dense growth of verdure. As far as I remember, three of the trees were ash, hawthorn, and elder. This was the tomb of a lady once residing in the parish, but whose family had long left the neighbourhood. In a churchyard not far from Worcester, an ash-tree, nature-planted, has been suffered to spring up within the railing of a lady's tomb, and as it grows larger will probably displace both tomb and railing. The lady's family left the parish some years since. So only last summer I observed two large trees—hawthorn and sycamore—within the railing of a tomb in Conway churchyard, North Wales. They were evidently of many years' growth, and had completely embowered and almost hidden the tomb. These are not trees that are planted over graves, for the weeping-willows and evergreens that are often placed in cemeteries by lamenting friends seldom grow so well as these wildings planted by Nature's hand. The Ash, from having winged seeds, is the most likely tree to get into neglected spots, and will even mount upon old pollard willows. But I have "no tale to tell" about these vegetable intruders, and should not like to reflect on the memory of the dead whose remains they shadow. These intrusive seedlings are, however, quite in the usual course of vegetable growth, though old tombs in country churchyards are more commonly invested with ivy or hidden by brambles. But occasionally trees get *within* churches, as at Ross, Herefordshire, where the stolons of a felled elm in the churchyard have forced their way within the sacred structure, and now embower a pew, *where, it is said*, the famed "Man of Ross" used to sit! This is made a wonder of by the Rossites, and photographs of the intrusive elm have been made, and are sold to inquisitive visitors. As "shady rows" of elms, as Pope says, were planted by the Man of Ross, there is something poetical and grateful in an elm offering a frondal bower to his memory where he once sat and worshipped. In Kempsey church, near Worcester, in a recess of the north wall, is the recumbent effigy of a knight in armour, which is shadowed by a horse-chestnut in full foliage; and by whatever chance the tree has sprung up within the church, it is allowed to grow there, and makes a pleasing object in contrast with the white walls of the chancel.—*Edwin Lees, F.L.S., Green Hill Summit, Worcester.*

EARTHWORMS, &c.—A short time ago I witnessed a curious encounter. An earthworm about three inches in length was in violent contortions, twisting itself into the shape of the letter S, and throwing itself out again, evidently striving to rid itself of an enemy. On closer inspection, this enemy was a small thing about half an inch in length with a brownish head and lighter-coloured body, which had fastened itself like a weasel on the body of the worm. I tried to secure the assailant, but it vanished too quickly for me into the light mould. I had but an imperfect view of it. Could it have been a wireworm, or are you aware of any insect likely thus to attack the common worm? The next morning I secured the worm with a piece off its body: this part was quite paralyzed, and in a few hours the worm was dead.—*W. A. C.*

ADDER-BITES.—Permit me to call your attention to a case (a fatal one) of poisoning by the bite of an adder, which occurred in Sutherlandshire, and has been recorded in *Land and Water* of August 1. I drew your attention, two months ago, to a case that had occurred in Sussex, but I did not see any notice of it in SCIENCE-GOSSIP. My reason for wishing the matter should be alluded to is simply this: I, a few years ago, mentioned that I knew of instances wherein the bite of a viper had caused death; and my assertion drew forth much contradiction. That I stated a fact has been fully borne out since, by the unfortunate occurrence of several fatal accidents from a like cause.—*H. E. Walney.*

STOCKING AQUARIA.—When living by the sea I used the two following methods, recommended by the Rev. J. G. Wood, to obtain aquarium objects. I either chipped off the piece of rock to which the anemone was attached, and transferred it bodily to my aquarium, or I used a very thin paper-knife, and slowly peeled the Actinia from the rock. In using the last method great care must be exercised, or the sucking base will be injured. In selecting anemones it is best to pick out the smallest, as they seem hardier, and do not require so much water. With regard to fish, I always obtained specimens from the nets of the fishermen, or from the rock-pools at low tide. Of course in keeping fish, anemones, &c., you must have fronds of algæ in the water, or your specimens will not thrive. With regard to food, it is better not to feed your anemones much, as they will live for months without any, and be none the worse for their fast. If you give them anything, let it be a tiny morsel of meat.—*W. H. Rean.*

OCOPS.—In answer to Mr. Harry Leslie, I think I can say that the term "Ocop" is applied in Devon principally to *Melolonthidæ* (cockchafer), and is a corruption of oak-web, probably from Anglo-Saxon "wibba," a worm. The smaller chafer with green thorax—I forget its name, common on fern—is always called Fern-web, as it is Bracken-clock in Scotland. It is famous as a trout-bait.—*Charles Kingsley, Eversley Rectory.*

OCOPS.—The word "Ocops," which your correspondent Harry Leslie has heard applied to various beetles in South Devon, is, I believe, the same which in North Devon is given to cockchafers only. I have always understood that the word is a corruption of oak-web, and that cockchafers were so called because, at certain seasons, they are found in great numbers on oak-trees.—*W. F. Richards.*

BOOKS, &c. RECEIVED.

"A Synopsis of British Mosses." By C. P. Hobkirk. London: L. Reeve & Co.

"Popular Science Review." October. London: Hardwicke.

"Monthly Microscopical Journal." October.

"Journal of Applied Science."

"The Animal World."

"American Naturalist." September.

"Les Mondes."

"The Colonist." &c., &c.

COMMUNICATIONS RECEIVED FROM:—W. E.—W. R. H.—B. M.—H. W.—J. E. R.—T. B.—W. T.—C. P. O.—J. H. B. B.—H. M.—C. D.—J. W.—F. W.—J. P.—J. G.—A. W. L.—L. A. B.—H. A. K.—R. W.—W. G.—A. N.—J. H. B.—J. C.—W. D. R.—J. T.—W. P.—W. H. P.—H. G. W. A.—W. S.—T. B. W.—W. L. S.—J. G.—J. K. J.—H. G. G.—E. H.—W. T.—C. H. B.—W. R. H.—J. B. M.—F. H. A.—B. W.—F. L.—W. M.—J. W. H.—D. B.—Dr. S.—E. H.—J. K. J.—J. S.—H. B. T.—R. T. S.—W. P. F.—F. W.—W. M. R.—E. W. M.—C. U.—R. R.—J. T.—W. H.—C. V. G.—W. W. S.—T. B.—W. W.—B. W. G.—A. W.—W. G. P.—G. R. W.—W. H. G.—W. F. S.—J. A.—G. D. B.—A. F. F.—J. P.—J. T. T. R.—J. S.—J. M. K.—H. P. A.—A. de S. G.—C. G.—J. K.—L. R. T.—K.—C. F. W.—S. A. B.—J. W.—A. C. H.—W. A. V.—T. L.—M. M.—J. W.—W. S. P.

NOTICES TO CORRESPONDENTS.

T. Swallow.—Your mosses are: 1. *Hypnum velutinum*, *Dicranella heteromalla*, and 3. *Lophocola bidentata*. Get Cooke's "British Hepaticæ," with figures, price 4d., or the parts now issuing of Carrington's "British Hepaticæ," both published by Hardwicke, 192, Piccadilly.—R. B.

Gemini.—We are not aware of any bird equal to the task of clearing away ants. Try sprinkling with a little carbolic acid.

Charles Dickie.—To clear a room of cockroaches place a shallow plate full of beer on the floor at night. As these insects are not Good Templars, they rush in large numbers to the beer, and thus share the fate of the Duke of Clarence.

H. G. W. A.—The Arachnid found in the grass to which you refer answers in its description to the Dog-tick (*Ixodes ricinus*).

G. R. W.—It is not uncommon for the spore-bearing fronds of young specimens of the flowering ferns (*Osmunda regalis*) to be converted into pinnules.

Ida F. T.—The malformed specimens of Corn Feverfew (*Pyrethrum inodorum*) come under what Dr. Masters, in his "Vegetable Teratology," calls "excess of development."

Horace.—The insect you inclosed was an Ichneumon (*Ophion*).

J. Sims.—We will do our best to obtain you a specimen of Miocene lignite. Perhaps some of our readers will forward us a bit from Bovey Tracey.

A Constant Subscriber asked us to name an "inclosed plant"; but none was "inclosed." By the way, we should feel obliged if our correspondents who wish to preserve their incog. would adopt some other *nom de plume* than "Constant Subscriber."

Mrs. A.—We are sorry to say your MS. has been mislaid, and is not to be found.

Thos. Buck.—It is not uncommon for the eggs of domesticated fowls to occur with double shells in the way you name. Double-yolked eggs are still commoner.

H. Marshall Ward.—*Potentilla fragariastrum*, similar to *Fragaria vesca*, but has no runners, nerves of leaflets not sunk above, and fruit very different. Hooker's "Flora of the British Isles."—B. W.

F. L.—The natural food of the larva of the common housefly (*Musca domestica*) is said to be horse-dung. Consequently, these insects are always most abundant in the neighbourhood of stables, &c.

D. Bradley.—The best work on Diatomaceæ is that now issuing in parts, by Dr. Donkin.

Dr. Smart.—Your specimens of flint were covered with a lichen called *Verrucaria nitida*.

J. K. J.—The package arrived, but the glass was smashed.

C. U. (Reigate).—Your specimen is not an Erica, but its near sister, the common Ling, *Calluna vulgaris*. Perhaps its unusually hoary foliage may have misled you into supposing it to be a form of *Erica tetralix*.—R.

H. E. Dent.—The specimen of *Lamium album* is the pretty and elegant variety, recognized as a species by some authors, under the name of *L. maculatum*; other writers, on the contrary, unite *L. lævigatum* and *L. maculatum* with *L. album*, into one species. We have noticed large roots of this variety in our cottage gardens.—R.

F. R., Clapham (August number, p. 189).—Green Caterpillars.—Dust your gooseberry bushes with white hellebore directly you see the caterpillars, and they will drop off dead. Broad beans planted in rows between the rows of gooseberry bushes preserve them from blight: supposed cause is, that the beans give out a great deal of carbonic acid gas.—A. F. F.

Mrs. A. Watney.—"Grevillea," edited by Dr. M. C. Cooke, is now published *quarterly*, by Williams & Norgate, Covent-garden, London.

A Constant Subscriber (No. 2).—The flower sent, found at Twickenham, is the Bloody Crane's-bill (*Geranium sanguineum*).

EXCHANGES.

One Hundred Species of Australian Shells for the last edition of Wood's "Index Testaceologicus," and 75 species for Chenu's "Manuel de Conchyliologie."—W. T. Bednall, Adelaide, South Australia. Correspondents desired.

Wanted, Spores of the Cryptogams, in quantities of not less than a quarter of a grain. One specimen of each genus will be sufficient. Other Microscopic Objects or Money given in exchange.—Medicus, Arnside House, Stretford-road, Manchester.

Packets of Foraminiferous Sand, containing all known British species, several marine objects, such as from Echinus, Anemones, Algæ, Sponges, &c., Parasites, Insects, Seeds of Orchids and Wild plants, Living and Dried Ferns in great variety, and Alpine plants.—T. McGann, Burrin, Oranmore, County Galway.

Bombyx Pernyi, *B. Cecropia*, *B. Promethia*, *B. Cynthia*, silk moths; *Sesia cepsophila*, *Sesia bombyciformis*, *T. fulva*, *M. literosa*, *M. orcuosa*, *N. mundana*, for any of the silk moths, except *B. mori* and *B. gamma mia.*—John Thorpe, Spring gardens, Middleton, near Manchester.

Rough and Chipped Flint Flakes, from north of Ireland gravels; also Flint Arrow-heads and Stone Celts for similar remains from other localities.—William Gray, Secretary of the Naturalists' Field Club, Belfast.

Wanted, specimens of Palm and Tree-fern Stems, suitable for the use of a science class, or information for obtaining them.—W. Piper, Bank Plain, Norwich.

For *Xenodochus carbonarius*, send stamped envelope to T. Brittain, 52, Park-street, Green Heys, Manchester. No exchange required.

For Leaf of Groundsel with Brand, send stamped envelope to T. Lane, 1, Camden-villas, Broomy Hill, Hereford.

Eggs of the Sandwich Tern, Eider Duck, Puffin, Dipper, Grasshopper Warbler, and others, for other British Birds' Eggs.—Joseph Watson, 20, Fountain-lane, Blaydon-on-Tyne.

For Living Plants of *Wolffia arhiza*, send stamped envelope, a small box, or a piece of oil silk, to Mrs. C. F. White, 42, Windsor-road, Ealing.

Rare Shells Offered: *Clausilia rugosa*, var. *Schlechtii* (new and rare variety recently determined by Mr. Jeffreys); *Helix obvoluta*, *Helix revelata*, *Pisidium cinereum*, *Clausilia dubia*, *Pupa anglica*, *P. edentula*, for—*Pupa minutissima*, *P. alpestris*, *P. substriata*, *P. pusilla*, *P. Venetzii*, *Limneus involutus*, *L. Burnetti*, *Succinea oblonga*, *Acme lineata*.—W. F. Sutton, Gosforth Grove, near Newcastle-on-Tyne.

Larvæ of *Betularia*, *Illunaria*, and *H. pisi*; Ova of *Illunaria* and *Angularia*, for other Ova, Larvæ, or Pupæ.—J. Pickles, 12, 13, Warehouse-hill, Leeds.

Wanted, specimens, living or preserved, of *Dionæa nepenthes* and *Sarracenia*, *Polygonatum verticillatum*, *Malaxis paladosa*, *Corallorhiza*. Offered: *Teucrium chamædrys*, *Senecio squalidus*, *Anchusa sempervivum*, &c.—W. G. Piper, Bank Plain, Norwich.

Phyllactinia guttatu, *Microsphæria Berberidis*, or *Nucinula bicornis*, fresh, for other Micro-fungi, or for Foreign Polyzoa.—George D. Brown, Henley Villa, Ealing, W.

Duplicates: *Australis*, *Empyrea*, *Obscurata*, *Nupta*, *Libratrix*, *Pisi*, *Oxycanthea*, *Lota*, *Testacea*, *Oculea*, *Limosa*, *Duplaris*, *Vinula*, *Bucæphala*, *Sambucata*, *Margaritata*, *Hirtaria*, *Fulvata*, *Badiata*, *Marginata*, *Plagiata*, *S. populi*, *Potatoria*, *Dispar*, *Caja*, *Ligustri*, *Rhamni*, *Corydon*, *Atalanta*, *Semele*, *Io*. Desiderata: many Local Species.—Morris Mond, Lewes.

Wanted to Exchange, three lots, 75 species in each, of South Australian Marine Shells, for common English Seashore Shells, common Ferns, and common Minerals; specimens to be named.—Address, W. P. Forwood, Port Adelaide, South Australia.

Fossils from the Chalk and Red Crag for Wenlock Limestone, Mountain Limestone, or Carboniferous Fossils.—C. Griffith, St. Swithin-street, Winchester.

Wanted, British Marine Shells in fine condition, for Foreign Shells.—A. W. Langdon, 4, Castle Down-terrace, Hastings.

Duplicates: Pupæ of Swallow-tailed Butterfly (*P. Machaon*) and Imagos of *T. quercus*, *A. Adippe*, and *P. Ægon*. Desiderata: *T. betulæ*, *C. Elpenor*, *Srapta C. album*, *M. Cinxia*, *M. Artemis*, *M. fuciformis*, or others.—D. I. Preston, Riversfield, Catton, near Norwich.

Wanted, Fronds of British Ferns, for others, or Micro-slides. Send list to F. W., Belvidere, Tenby.

British Birds' Skins and Eggs, for Insects, Shells, Fossils, and Minerals, or rare Eggs. Microscopic objects not wanted.—J. T. T. Reed, Ryhope, Sunderland.

For Cuticle of Indian Corn send a stamped directed envelope to W. H. Gomm, Somerton, Taunton.

For Stems of *Pteris aquilina* and *Acacia*, prepared for section-cutting, send stamped envelope and object of interest to A. Haward, 1, Shirley-villas, Addiscombe-road, Croydon.

Six first-class well-mounted Micro-slides, various subjects, for each number of "Quarterly Journal of Microscopic Science."—H. B. Thomas, Boston, Lincolnshire.

Good Crag Fossils, for good Upper Silurian Fossils.—Address, J. E. T., 192, Piccadilly, London.

For a Leaf of common Daisy, with Cluster-cups, send stamped directed envelope to J. Turner, Davenport, Stockport.

A Book Folding-case in roan leather, to hold 72 Slides, for good mounted objects.—F. W., Belvidere, Tenby.

For Pollen of *Cobea scandens*, send stamped envelope to R. Ratcliffe, 25, Market-street, Newcastle-on-Tyne. Anything acceptable.

Wanted, 59, 233, 464, 579, 1178, 1131; for 57, 232, 466, 574, 802, 846, of London Cat.—Rev. F. H. Arnold, Fishbourne, Chichester.

Well-mounted Slides of Marine Algæ, named, for mounted sections of Human Body, &c.—R. T. Smith, 25, St. Alban's-street, Weymouth.

Marine Shells from Devon coast, also British Land and Freshwater for exchange. Lists exchanged.—Martin, 97, Union-street, Torquay.

Wanted, spores of *Cryptogams*, in quantities of not less than one quarter of a grain for which other microscopic objects or money will be given. One example of each genus will suffice. Address, Medicus, Arnside House, Stretford-road, Manchester.

THE HISTORY OF OUR CULTIVATED VEGETABLES.

No. VII.—THE PARSNIP (*Pastinaca sativa*).

THE Parsnip belongs to the same tribe of plants as the Carrot (*Umbelliferæ*), and grows on similar soils. In its natural state the stem rises from two to three feet high, bearing yellow flowers, which are succeeded by thin, flat, oval-shaped fruit. The leaves are simply pinnate, shining, downy beneath, and are not so delicately formed as those of the Carrot. Like that plant the Parsnip is biennial.

It appears that this vegetable was reclaimed and early cultivated at Gelduba, in the neighbourhood of the Rhine, from which place the Emperor Tiberius, who held parsnips in high repute, had them brought annually to Rome. They were served for the table with their pith taken out, after being boiled; and eaten with a sauce made of honey or mead. The ancients attributed wonderful qualities to this root, and it was much esteemed by the worshippers of Vulcan. Pliny tells us the Romans were accustomed to transplant their parsnips in the spring into ground that had been dug to a considerable depth for the purpose, and that they were fit for eating at the end of the year, still better at the end of two; but it was impossible to get rid of its strong pungent flavour. It was also believed that persons who carried this plant about with them were never stung by serpents. Mixed with axle-grease (*Axungia*), properly swine grease, with which the axle-trees of the chariots were rubbed, it was applied to parts of the body stung by reptiles, and the leaves were eaten as a remedy for indigestion.

Parsnips might have been brought into England by the Romans, but of this we have no account. Hartlib, who wrote in 1650, states that they were introduced with carrots, &c., from Holland or Flanders. Old Gerard says, "The herbelist of our time do call the garden parsnip *Pastinaca*, and therefore we have surnamed it *Latifolia*, or broad-leaved, that it may differ from the other garden parsnip, with narrow leaves, which is truly and properly called *Staphylinus*, that is the garden carrot." Parsnips were also called Mypes in the time of this author, who adds they are more nourishing than carrots or turnips. He tells us that there is good and pleasant bread made from the roots of the parsnip, "as my friend Master Plat has set forth in his book of experiments." That student in physic and astrology, Culpepper, states in his "Herbal," "that the root of this vegetable is often used, but the seed much more. The wild being better than the tame, shows Dame Nature to be the best physician." Parkinson informs us that the seed ripens the second year after sowing, and adds, if they do flower the first year, the country people call them Madde Neepes.

Ray says it is asserted by some writers that eating old parsnips is likely to cause delirium and madness, and for this reason they are called Mad Napes. Withering states that the seeds of this plant contain an essential oil; they were much used in medicine, and were often taken to cure intermittent fevers, and should be those of the wild plant; but the druggists in his time commonly sold the seed of the garden kind, which they could purchase at an easy price when it was too old to grow. Dr. John M'Culloch was the first writer who noticed more than one cultivated variety of this plant. In his paper on the Parsnip, addressed to the Caledonian Horticultural Society, September, 1814, he mentions three kinds being known in the islands of Guernsey and Jersey: in the same paper he mentions that this plant will stand the frost better than any other vegetable. "The unusually severe winter of

1813-14," he writes, "has enabled me to decide this question most positively and to name the parsnip the only cultivated root which appears to defy all cold. In the garden of a friend at Waltham Abbey a crop of parsnip was suffered to continue in the ground throughout the winter. That land is well known to be wet meadow-land, and was frozen in a solid mass to the depth of a foot or more. The roots remained unhurt, and while I write (in the beginning of April, 1814) they are all putting out their new shoots." They also withstood the intense frost of 1838 in the open ground. A very large variety, with roots three to four feet long and three inches in diameter, is much cultivated in Normandy and the Channel Islands as food for cattle. As an agricultural plant, it is not much cultivated in England; but in Jersey and Guernsey it forms one of the most important crops, and the preparation of the land, which requires deep ploughing, is one of the most laborious tasks of the small farmers in the early spring. One Jersey farmer is recorded to have raised upwards of 14,000 lb. of parsnips upon about a quarter of an acre of land. Very little manure but seaweed is used; still the quality of the root is materially affected by the soil, and it exhausts the land more than the carrot. According to Colonel de Couteur, the weight of a good crop varies from thirteen to twenty-seven tons per acre, the latter quantity being sufficient to suppport twelve Jersey cows for six months, with a mixture of mangolds and turnips. Don states that in the fattening of cattle, the parsnip is found equal if not superior to the carrot, performing the business with much expedition, and affording meat of an exquisite flavour and of a highly juicy quality. The leaves being more bulky than those of carrots, may be mown off before taking up the roots and given to cattle and horses, which will devour them greedily. The parsnip yields a large quantity of nourishing food for human kind. In the north of Scotland, Neill observes, "they are often beat up with potatoes and a little butter; of this excellent mess the children of the peasantry are very fond, and they do not fail to thrive upon it." From the same authority, we learn that in the north of Ireland an agreeable beverage is prepared from the roots brewed with hops. Phillips informs us that a wine made from these roots approaches nearer to the Malmsey of Madeira and the Canaries than any other wine. It is made with little expense or trouble, and only requires to be kept a few years to make it as agreeable to the palate, as it is wholesome to the body. A very pure spirit is obtained when parsnips are distilled after a similar preparatory process to that used with the carrot. The parsnip resembles the carrot in composition. In the latter, however, the starch, which is found in considerable quantity in the parsnip, is replaced by sugar. This plant, like the carrot, is found wild in all parts of Europe, except Lapland and Finmark. The name is derived from *Pastus*, nourishment, or, according to others, *Pastinum*, a dibber, or a tool used in digging vineyards, the root resembling that implement in form.

HAMPDEN G. GLASSPOOLE.

SPECULATIONS CONCERNING THE USES OF COMETS IN THE UNIVERSE.

BY JOHN I. PLUMMER, M.A.

PART II.

THERE are several other considerations deserving our attention, which may be thought to strengthen more or less the hypothesis I have enunciated in the foregoing number regarding the uses of comets, and of which I must say a few words. Our knowledge of chemistry is perhaps not sufficiently advanced to enable us to declare positively that the substances, which spectroscopic analysis has proved to exist in the nebulæ, and of which they are either wholly or in great part composed, are not in themselves adequate to form a central sun and system of attendant worlds. It cannot, however, be denied that the nebular hypothesis, the brilliant conception of Kant and of Laplace, while it has received on the one hand much confirmation from recent discoveries, has been to an equal, perhaps to a greater, extent rendered less probable by them. It has been incontestably proved that true nebulæ, masses of gaseous matter, actually exist, but we can scarcely conceive that the three simple, non-liquefiable gases, whose united spectra constitute that of the nebulæ, can, unless by the help of additions from without, be competent to build up a system of the same character as that of which our own planet is a member; and this becomes still more difficult to admit when we find the elements which such systems would appear to want, existing as wandering bodies of whose use we are otherwise quite ignorant. Yet once allow that the cometary system has a share, and an important share, in the development of new stars and systems, and the hypothesis may stand as securely as before, challenging, as it has always done, our admiration for its beauty, for its simplicity, for its comprehensiveness, and for the boldness with which it has been originally conceived and subsequently maintained.

As has been frequently asserted, it requires, however, that nebulæ of every degree of condensation should be found in the heavens, a fact sufficiently well attested already by the telescope, but of which the spectroscope has given us little, or perhaps even contradictory, evidence. It is true that the faintness of these bodies places serious obstacles in the way of such observations, but it has been noted that over and above the bright line spectrum of which I have so frequently spoken, there exists generally an excessively faint continuous spectrum, such as would be given by a liquid or solid nucleus. No observations have been made of the relative brightness of this continuous spectrum in different nebulæ, nor as compared with that of the lines themselves, and in the face of the difficulties to be surmounted in such an inquiry no undertaking of the kind is likely to be attempted. Still, the existence of the continuous spectrum tends very strongly to confirm our supposition, since this is precisely the way in which the product of the chemical union of the cometary matter with the nebular would be expected to show itself. On the contrary, an increased density of the gases near the centre gradually becoming in the more marked instances a liquid nucleus, such as the nebular hypothesis assumes to exist in such cases, would lead to a very different result. If this were the condition of the condensed or developed portion of the nebula, we should necessarily find the bright lines assume a much more sensible width there than near its borders, where the gases would be subject to less pressure, or at least that in different nebulæ the bright lines would present considerable differences of width, a result so entirely opposed to observation, that it does not seem too much to say that the theory I have suggested and the hypothesis of Laplace must stand or fall together, or that the supporters of the latter must suggest some explanation or emendation which at present they have not attempted.

A few well-developed nebulæ should present us with another feature. When all, or nearly all, the original gaseous constituents have been absorbed by combination with other matter, and the nebula has assumed a liquid or semi-solid form, we ought to find a body giving a continuous spectrum, but irresolvable by the telescope into individual stars; a disc of greater or less extent should present itself similar in form and appearance to the well-known planetary nebulæ. It will be known to my readers that a considerable number of these have equally defied the powers of the telescope and of the spectroscope. While the former instrument, in its most powerful form, has failed to pronounce them aggregations of stars, the latter has also failed to declare them gaseous. The presumption has hitherto been that this remainder would be resolved into stellar groups if the powers of the telescope could be indefinitely increased; but this may still be questioned. To assume such developed nebulæ to be liquid globes in the second stage of formation would be absurd, did we hold that these bodies are more remote than the stars themselves; but there is no evidence whatever that such is the case, and in the want of it we are equally at liberty to believe them, on the contrary, our nearest neighbours. It is an assumption also that brings with it no slight sense of relief, since we are no longer obliged to attribute to the larger members of the group dimensions so enormous, that even the mind trained to comprehend the greatest magnitudes fails and shrinks from attempting to grasp their real volume.

I now come to speak of the probable uses of comets to systems like our own, which are fully developed, and find myself equally left to speculate rather than to determine. For some years the question of the source whence the enormous expenditure of solar heat is replenished has remained undiscussed and undecided, and yet it is a problem well worthy consideration. If the only satisfactory theory that has been proposed, namely, that the solar waste is renewed by the heat generated by the falling of meteoric bodies upon its surface, is upheld, the intimate connection of these with comets puts the latter in somewhat close relation with this subject. Nor is the popular opinion that large comets give rise to increased solar heat altogether to be despised, especially as it is found to be an almost universal belief. Statistics are not wanting to show that years noted for large comets have also been remarkable for exceptional crops and vintages. In Germany and France the comet wines are invariably spoken of as the most excellent, while in England the popular notion is as well known as it is well supported by several recent and rather perplexing instances. Wide-spread beliefs such as this are always to be respected, being generally the result of an immense number of individual experiences; and although of themselves of no value as evidence of a scientific truth, they will often direct our investigations aright when we may be wise enough to be guided by them. Schiaparelli has demonstrated that since meteoric streams follow in the orbits of comets, the latter must be environed by the densest part of the stream, and our experiences of the Biela Comet meteors which fell in such profusion on November 27th, 1872, and of those known as the Perseids, and which are connected with a comet visible in 1862, fully bear out his deductions. If, therefore, the meteors supply the waste of solar heat, it is not difficult to understand that the approach of a comet, especially when large, accompanied by a dense, wide-stretching cloud of these bodies, may produce a marked increase in the amount of heat received from the sun, because a large addition to the ordinary supply of fuel has been brought within the range of its attraction;* but it must be noted that owing to the

* If the neighbourhood of the sun is occupied by a very extended atmosphere, the smaller meteorites, as offering relatively to their mass a greater opposing surface, will be more impeded by their passage through it than the larger, and will fall in spiral orbits upon the sun's surface: this would materially increase the sun's range or power of attracting these bodies to itself, as I have already hinted in the previous part.

variety of composition of comets and meteors, and the very various degrees of nearness of approach to the sun's surface by them, very different effects must be expected to take place in different cases.

We have here a fairly wide field for future observation and research, for it would still remain to discover whether this supposed cause of increased heat acts directly or indirectly. The action of the sun upon comets is very great, strangely varied, and easily noticed, and it may well be that some reciprocal action is produced upon the sun's surface by them that may be observable. I may hint here that the observation of the solar spots at and near the time of the perihelion passage of a comet might throw some light upon this problem, as, if my theory is correct, some disturbance of the solar atmosphere is to be expected. Had the sun's surface occupied the attention of astronomers as much as the movements of comets have done, it would have been comparatively easy to test the suggestions now thrown out; but unfortunately bright comets appear so rarely that the establishing of such a theory must necessarily occupy a considerable interval of time. We are forced rather to depend upon collateral evidence, upon the fitness of the hypothesis to fill a void previously noted, or to connect together into a consistent whole facts already acknowledged. In some respects this last is claimed for the speculations I have made upon the probable uses of comets. The nebular hypothesis appears to receive from them some much needed support on the one hand, and on the other the meteoric theory of the maintenance of the solar heat, to which it serves as a connecting link, blending the two theories into one. The popular belief in cometary heat has received a possible explanation, and the opposite constitution of comets and nebulæ pointed out as significant. It is of the utmost importance that no fact should be distorted in order to give a colour to a theory insecurely based, and this I have been most careful to avoid. One or two assertions have been made in opposition to previously accepted opinions, which it is open to the reader to accept or reject as he may see reason for so doing; but it is certain that the discussion of these points, whichever way they may be decided eventually, can result only in the establishment of truth.

As one of the strongest evidences of design in the creation must ever be that each individual part of it has its appropriate function to perform, and actually serves a most useful purpose, we are bound to show that both comets and meteors either are, or have been, of eminent service in the development or maintenance of our own system, or else to yield this argument to our opponents. I have suggested certain uses for these bodies, which, so far from contradicting any known fact of science, may fairly be taken as in agreement with the most advanced state of knowledge, at the same time that I have contributed some ideas which indicate, as I believe, the direction in which scientific discovery must tend in future.

Orwell Park Observatory.

A FRESH-WATER POLYZOON.

(*Lophopus crystallina.*)

THIS beautiful Polyzoon, of which I send a sketch, was obtained from a dyke near the paper-mills at Chartham, about three miles from Canterbury, on July 9th, 1874.

The *Lophopus* is one of the largest fresh-water Polyzoa known. When exserted they are about $\frac{3}{16}$th of an inch in length, and are found attached to the roots of *Callitriche verna*, duckweeds, and other fibrous roots in shady dykes of slow-moving water, under thick masses of floating plants; for in their habits they are light-shunning animals, and are always on the under-side of aquatic plants. They are very beautiful microscopic objects, and their being perfectly transparent renders them most interesting animals for examination, as the formation of their statoblast (*f*) can be seen in their different stages of growth, from their first appearance as a little swelling (at which stage they are quite colourless) to their perfect form, when they become detached and fall free in the perigastric space (*l*), having become gradually coloured, the centre of a dark brown, and the margin a rich yellow. The process of their propagation by gemmation or budding, by which young ones are added to the existing colony of living Polyzoa, can be plainly seen; while the statoblasts (*f*) are designed to propagate the species in the following spring, and are liberated from the Polyzoon at its death, when the transparent sac is decomposed, and the statoblast escapes and sinks to the bottom of the water.

The perfect transparency enables us to witness the internal operations of their system. The action of the stomach in the process of digestion can be observed with great clearness. The contents are seen at times to consist of small desmids, such as *Closterium Lunula*, *Navicula*, and other disc-shaped and globular bodies, together with decayed vegetable matter, &c. As the action of cilia on the expanded tentacles causes a current of water to set in towards the mouth (*a*, *h*, *h*), bringing with it the food required; and if in the vortex thus formed there should be any large and objectionable pieces, they are prevented from entering the mouth by a quick lashing motion of the tentacle, which rejects and throws them out of the reach of the vortex. The accepted morsel passes directly into the œsophagus (*b*), from thence into the stomach (*c*), where it is digested by the up-and-down motion of a contracting and expanding nature of that organ. The lower part of the stomach at intervals is seen to be contracted somewhat in the shape of an hour-glass, in which for a moment part of the contents of the stomach are retained, and then again released to mix with the rest. After being subjected to the action of the stomach for some time, the alimentary matter is delivered by degrees into the intestine (*d*), from whence it is expelled through the vent (*o*), in form of oval or egg-shaped pellets.

great rapidity. No doubt this motion is produced by vibratile cilia on the interior of the body, though not to be observable. In some of the colonies of the *Lophopus* there are a number of globular bodies (*g*), varying in size from the $\frac{1}{1200}$th of an inch in diameter up to the size of an ordinary *Volvox globator*. These bodies are considered to be parasitical, as they do not appear to have any necessary connection with the economy of the Polyzoa in whose interior they occur. This would appear to be the case from the fact that in some colonies not

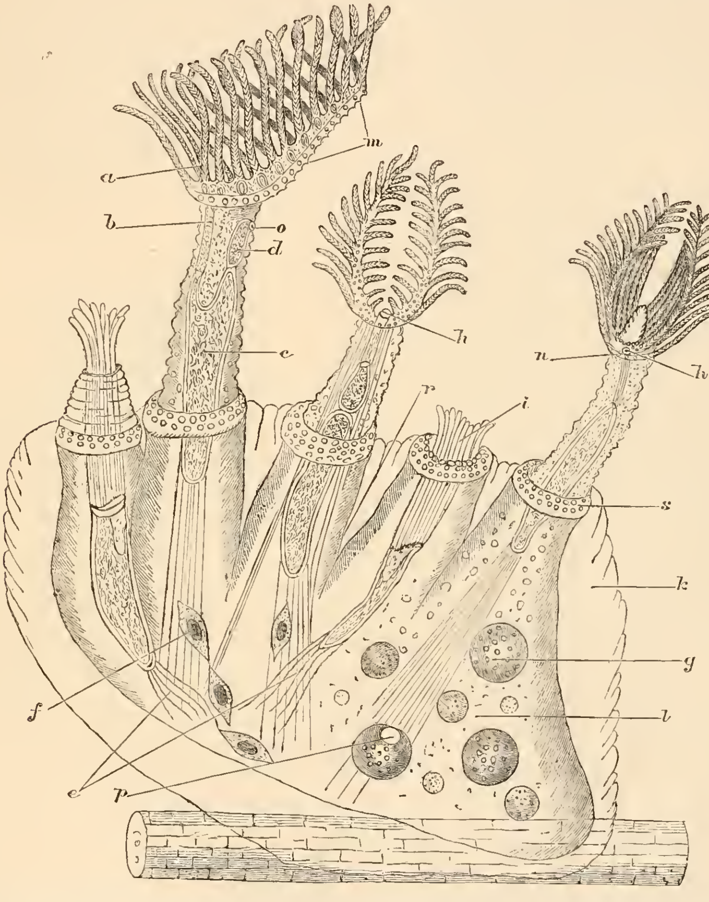

Fig. 177. Fresh-water Polyzoon (*Lophopus crystallina*): *a*, region of the mouth; *b*, œsophagus; *c*, stomach; *d*, intestine; *e*, muscles; *f*, statoblast; *g*, parasitic globes; *h*, *h*, mouth; *i*, tentacles retracting within cell; *k*, outer transparent envelope; *l*, perigastric space; *m*, lophophore; *n*, tentacles excised to show mouth; *o*, vent; *p*, hollow globe; *r*, place where division commences; *s*, cell.

The perigastric space (*l*) is filled with a clear fluid, which also extends up the lophophore (*m*), in which fluid are seen floating numerous particles of very varied forms and sizes, the smallest ascending to the tip of the lophophore (*m*). By the movement of those bodies it is evident that there is a constant rotating motion in this transparent fluid, by which these particles are kept in a perpetual whirl from one part to the other, and at times with

one of them is to be seen, while in others they are very numerous.

In one instance of a colony under my observation they were increased in such numbers of all sizes that they entirely filled the perigastric space (*l*) forcing the smaller particles up even into the lopho phore (*m*), and ultimately bursting the whole colony and escaping into the water, when all motion n them ceased, and they soon disappeared altogether. When they are few in number, and of various sizes in the animal, they form a novel and pleasing sight as they are carried up and down by the current before mentioned in the perigastric space; at times revolving with great rapidity on their own axis, and at the same time round one another. Frequently a group of five or six may be seen revolving together. Some of them are perfectly clear, others are partially covered with small globular forms of a brighter appearance than the globe itself. The largest of them are sometimes marked with irregular patches of various shapes, and as they revolve on their axes, it gives them the appearance of a miniature world. A few show an opening (p), by which they are seen to be empty hollow globes, but what they really are is not known.

On being alarmed, the *Lophopus* quickly retracts within the transparent cell (s), and again protrudes when all is quiet, unfolding its beautiful crown of tentacles, in the course of which movement the action of the muscles is plainly seen (e). The expanding of the tentacles immediately on the protrusion of the polypide from its cell is one of the most pleasing sights that can be presented to the observer, as the cilia with which they are studded are instantly in full play, passing up on one side of the tentacle from the base to the tip, and down the opposite side, like an endless chain, thereby forming the vortices in the water by which the particles of food are brought to the mouth. Sometimes the colony consists of from six to twelve polypides, and will divide into two colonies, commencing the division at p, and slowly separating down to the point where it is fixed to the plant, &c., each part moving in opposite directions. They then propagate by gemmation or budding. This process is very interesting to watch, from the first appearance in the parent to the issuing of the young from the newly-formed cell. When the minute tentacles of the young are exserted, they form a beautiful contrast to the fully developed of their parents. Though small, yet the same functions are visible in relation to digestion, &c., as in the older ones.

I would advise those lovers of natural history who possess a microscope and live in a neighbourhood where there are shady dykes or a millpool, &c., to search for them; when found they will amply repay the trouble in the pleasure they afford in observing and investigating their wonderful mechanism and marvellous beauty. No pencil can portray nor pen describe them. I have had them under observation for over three months, have seen some of the colonies die out, and have their statoblasts in glass cells, from which I anticipate the pleasure of seeing the young Polyzoa emerge in due time.

In endeavouring to show the position of the mouth in the sketch (h) I have left out the continuous line of tentacles at n, where, to complete the crown, they should be continued quite round; but then the mouth could not be seen, only the region of the mouth, as shown at a. Transparent as those creatures are, they are covered by a still more transparent envelope (k), which escaped my observation until my attention was called to some *Vorticella* and *Rotifer vulgaris* that were attached to something near the *Lophopus*, which on closer examination proved to be the outer envelope which entirely covers them, with the exception of the orifice of the cell. The Rotifers, being attached to an almost invisible substance, become very interesting objects. The muscles of *Lophopus*, when the polypide is fully exserted, are seen drawn tight, and have the appearance of fine glass threads; when retracted within the cell (i), the muscles are relaxed and bent (e).

Canterbury. JAMES FULLAGAR.

THE DIADEM SPIDER.

(*Epeira diadema.*)

LEUWENHOEK, about the beginning of the last century, recognized only five species of spiders. More than two thousand years before this, Aristotle had, in the ninth book of his zoological work, described eight kinds—spiders, doubtless, found in Greece, and with which the philosopher was practically acquainted. Eighty years of the eighteenth century had scarcely elapsed before Dr. Berkenhout described twelve species as indigenous to this country, first and foremost among which he placed the Diadem Spider. Although these two or three native spiders have now increased to several hundreds, yet *Epeira diadema*, considered historically, and economically too, perhaps is the most interesting of them all.

The ancient naturalists had often watched a spider that was wont to spread its snare from tree to tree, to wait, motionless, for many an hour in the centre of its web, and, when an insect was unfortunate enough to become entangled, to rush up and envelop it in threads. This, one of the largest, brightest, and commonest of the geometers, could not have failed to attract their attention. The Diadem Spider adorns our gardens in the autumn with a web intricately woven, yet wonderfully simple as a whole. It is suspended perpendicularly, or somewhat obliquely, from plant to plant, from wall to wall; the denizen, head downwards, occupies the centre, or is concealed by the duplicature of a leaf.

The question may be asked, why does the spider invariably watch in an inverted position? The Abbé La Pluche has attempted to explain this; he says, the abdomen in any other attitude would fatigue her too much: is it not rather that the eight eyes, so curiously arranged, may have as large a field of view as possible? The food of this species is very various, dipterous insects being most commonly taken. One sometimes sees ladybirds (*Coccinella bipuncta*), bees, and hornets, in their webs. Most books on natural history say that, not only will a spider object to make a meal of a hornet, but will even assist the insect in disengaging itself. I was not sceptical of the statement until I saw a garden spider feeding on a hornet, and a bee, placed *hors de combat*, waiting its turn. A sunny day is the hope of the spider; a wet one, the forlorn hope. In the former case many a dipterous insect is on the wing, and, incautiously flying over garden beds, and among garden plants, too often falls a victim to the webs of the Geometric spiders. I have known a female of the species under notice catch no less than six large flies and a gnat in the course of a single day.

Fig. 178. Diadem Spider (*Epeira diadema*).

This species does not wait until the prey is fairly involved, as the house spider is said to do; on the contrary, they will rush out when a fly merely buzzes close by, and, giving the web a shake they dart back, and once more conceal themselves from view.

We will suppose a large fly is caught: the active spider is upon it in an instant, and, cruelly burying the falces in the body of the struggling fly, waits, with these instruments imbedded, until the insect is dead. This, as we shall see hereafter, takes several minutes. The spider does not always begin in this way; in fact, it is the exception, rather than the rule. Sometimes she envelops her victim immediately after the first incision, and while the insect is still struggling; sometimes she envelops it first and bites it afterwards; and, finally, sometimes envelops and leaves the prey suspended without attempting to inoculate the poison at all. If the web contain no other capture, she drags the insect to the centre, there to feed upon it at her leisure; but if there are other insects to dispose of, she leaves it where it was caught. The process of envelopment appears to be as follows:—With the front pair of legs the spider, with marvellous dexterity, turns the prey round and round, simultaneously drawing out a row of threads by means of the fourth pair of legs; with the latter she rapidly sweeps them, as it were, over and over the body of the revolving animal; in this way the whole body is very soon surrounded by a sort of cocoon. After wrapping the threads round for some time, the arachnid pauses in her work, sometimes to inflict a bite, and, should she perceive any part not sufficiently covered, and the animal still struggling, to heap on more threads. When the victim is too bulky to be revolved conveniently with the fore-feet, the spider runs round and round, previously, of course, having taken the precaution to press the spinnerets against her web.

Should the fly be small, the spider seldom troubles to spin threads round it, but, having seized, carries it off by means of the falces, or the mouth, to the spot where she wishes to devour it.

We will suppose this operation, which usually occupies a few seconds only, over. The spider now breaks the threads surrounding the temporary cocoon, reserving a single firm one, however, to draw it to her *salle à manger*. But it is obvious that progressive motion would pull the thread from the spinnerets so that the prey would be left behind. To prevent such an occurrence, the spider places one of the feet either on the single thread or on the body of the victim. In the case of a fly, I have seen a spider go through some unaccountable actions; for instance, after dragging the insect some way along the web, she left it dangling in the air, proceeded a little alone, turned round, walked up to her prize, rolled it over and over, and once more took it in tow; these performances were repeated several times.

The captive is occasionally very troublesome and tenacious of life. I once threw a well-known myriapod (*Geophilus longicornis*) on the web of a Diadem Spider. The latter, notwithstanding the long and narrow body, and innumerable lively legs of the mould-dweller, succeeded in encompassing it with threads, but the centipede soon freed its head and waved it aloft as if in defiance. The spider was not to be daunted, but made futile attempts to thoroughly incarcerate the awkward animal, for no sooner was one part bound down than another became free. The same species of Geophilus was put on the web of another individual; this time the spider did not attempt to carry off the centipede, but, having wrapped it round many times, took up her position in the centre of the web, but the ever-moving antennæ and legs soon called her forth to fresh exertions. The spider stood over the animal for upwards of an hour, every now and then giving it a sharp bite; it was a long time before the centipede was dead. On another occasion a repulsive beetle (*Ocypus olens*) was flung near the centre of a web. The occupant soon wound it round, notwithstanding that the beetle formed the back into a most awe-instilling curl, and gnashed the mandibles until the head was bathed in the dark-brown liquid the beetle emits on being handled.

The formidable *Lithobius forcipatus* was perfectly at fault on the web of a spider, its mandibles and clawed feet being of no avail.

Like newts, spiders will seldom seize a motionless animal. The following fact appeared to prove this: The full-grown larva of a moth (*Arctia menthasteri*) was thrown on a spider's web; as the caterpillar remained perfectly immovable, the spider descended, and caused the load to drop below by breaking the threads round it. The caterpillar was replaced, this time it moved, the spider immediately wove a cocoon round it, but the larva was very active, struggled violently, the threads gave way, and it was precipitated below. Spiders, in like manner, free their webs of leaves and other objects that fall or are blown on them. They go systematically round the leaf, breaking off thread by thread by means of a falx. In one case a leaf was cut down with the exception of a single thread adhering to the stalk: the spider did not trouble to break this, nor was it necessary to do so, for it shortly fell by its own weight. In another instance a leaf fell on the upper surface of an oblique web, consequently it became more and more involved according as the spider increased her efforts to get rid of it. The upshot of the affair was, the spider gave up, after having demolished half the web.

E. Halse.

CARNIVOROUS PLANTS AND THEIR PREY.

By Professor C. V. Riley.

THE insect-catching powers of these curious plants, the Fly-traps (*Dionæa*), the Sundews (*Drosera*), and the Trumpet-leaves (*Sarracenia*), have always attracted the attention of the curious, but renewed interest has been awakened in them by virtue of the interesting experiments and observations on their structure, habit, and function, that have lately been recorded, and especially by the summing up of these observations in some charming papers by Professor Asa Gray, which recently appeared under the title of "Insectivorous Plants."

Through the courtesy of various friends I am able to submit the following notes of an entomological bearing on the Spotted Trumpet-leaf (*Sarracenia variolaris*), which must henceforth rank with the plants of the other genera mentioned as a consummate insect-catcher and devourer. The leaf of Sarracenia is, briefly, a trumpet-shaped tube with an arched lid, covering, more or less completely, the mouth. The inner surface, from the mouth to about midway down the funnel, is covered with a compact decurved pubescence which is perfectly smooth and velvety to the touch, especially as the finger passes downward. From midway it is beset with retrorse bristles, which gradually increase in size till within a short distance of the bottom, where they suddenly cease, and the surface is smooth. There are also similar bristles under the lid. Running up the front of the trumpet is a broad wing with a hardened emarginate border, parting at the top and extending

Fig. 179. Pitchers of *Sarracenia variolaris.*

around the rim of the pitcher. Along this border, as Dr. Mellichamp discovered, but especially for a short distance inside the mouth, and less conspicuously inside the lid, there exude drops of a sweetened, viscid fluid, which, as the leaf matures, is replaced by a white, papery, tasteless, or but slightly sweetened, sediment or efflorescence; while at the smooth bottom of the pitcher is secreted a limpid fluid possessing toxic or inebriating qualities.

The insects which meet their death in this fluid are numerous and of all orders. Ants are the principal victims, and the acidulous properties which their decomposing bodies give to the liquid doubtless render it all the more potent as a solvent. Scarcely any other Hymenoptera are found in the rotting mass, and it is an interesting fact that Dr. Mellichamp never found the little nectar-loving bee or other Mellifera about the plants. On one occasion only have I found in the pitcher the recognizable remains of a Bombus, and on one occasion only has he found the honey-bee captured. Species belonging to all the other orders are captured, and among the other species that I have most commonly

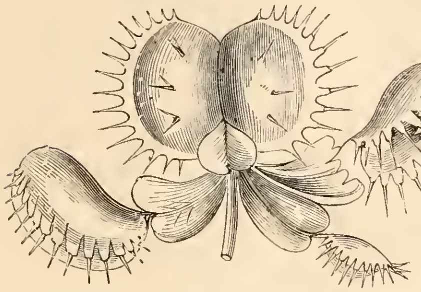

Fig. 180. Leaves of Venus Fly-trap (*Dionæa muscipula*).

met with, which, from the toughness of their chitinous integument, resist disorganization and remain recognizable, may be mentioned *Asaphes memnonius* and *Euryomia melancholica* among Coleoptera, *Pentatoma ingens* and *Orsilochus variabilis*, var. *complicatus*, among Heteroptera; while kyatids, locusts, crickets, cockroaches, flies, moths, and even butterflies, and some Arachnida and Myriapoda, in a more or less irrecognizable condition, frequently help to swell the unsavoury mass.

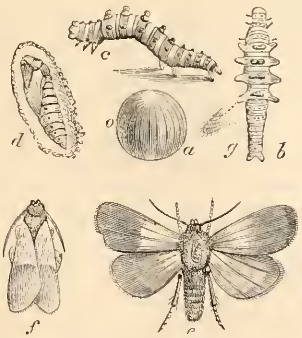

Fig. 181. *Xanthoptera semicrocea*: *a*, egg, enlarged, the natural size indicated at side; *b*, *c*, larva, back and side views; *d*, chrysalis; *e*, moth, normal form, with wings expanded; *f*, pale variety with wings closed.

But while these insects are decoyed and macerated in order, as we may naturally infer, to help to support the destroyer, there are, nevertheless, two species which are proof against its siren influences, and which, in turn, oblige it either directly or indirectly to support them.

The first is *Xanthoptera semicrocea*, Guen., a little glossy moth, which may properly be called the Sarracenia Moth. It is strikingly marked with grey-black and straw-yellow, the colours being sharply separated across the shoulders and the middle of the front wings. This little moth walks with perfect impunity over the inner surface of the pitcher, which proves so treacherous to so many other insects. It is frequently found in pairs within the pitchers soon after these open, in the early part of the season, or about the end of April. The female lays her eggs singly, near the mouth of the pitcher, and the young larva, from the moment of hatching, spins for itself a carpet of silk, and very soon closes up the mouth by drawing the rims together and covering them with a delicate, gossamer-like web, which effectually debars all small outside intruders. It then frets the leaf within, commencing under the hood and feeding downward on the cellular tissue, leaving only the epidermis. As it proceeds, the lower part

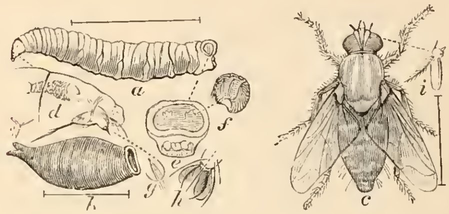

Fig. 182. *Sarcophaga Sarraceniæ*: *a*, larva; *b*, pupa; *c*, fly, the hair lines showing average natural lengths; *d*, enlarged head and first joint of larva, showing curved hooks, lower lip (*g*), and prothoracic spiracle; *e*, end of body of same, showing stigmata (*f*) and prolegs and vent; *h*, tarsal claws of fly with protecting pads; *i*, antenna of same. All enlarged.

of the pitcher above the putrescent insect collection becomes packed with ochreous excrementitious droppings, and by the time the worm has attained its full size the pitcher above these droppings generally collapses. This worm when fully grown is beautifully banded transversely with white and purple or lake-red, which Dr. Mellichamp poetically likens in brightness to the Tyrian dye. It is furthermore characterized by rows of tubercles, which are especially prominent on the four larger legless joints. It is a half-looper, having but six prolegs, and keeps up, in travelling, a constant restless, waving motion of the head and thoracic joints, recalling *paralysis agitans*. The chrysalis is formed in a very slight cocoon, usually just above or within the packed excrement. The species, kindly determined by Mr. A. R. Grote, was many years ago figured by Abbott, who found it feeding on *Sarracenia variolaris*, in Georgia. Guenée's descriptions were made from these figures, for which reason I append a few descriptive notes from the living material. It feeds alike on *S. variolaris* and *S. flava*, and there are two broods each year; the first brood of larvæ found during the early part of May, the second toward the end of June, and disappearing with the dying of the leaves, the latter part of July.

The second species is a still more invariable living accompaniment of both kinds of Sarracenia mentioned. By the time the whitish efflorescence shows around the mouth of the pitcher, the moist and macerated insect-remains at the bottom will be found to almost invariably contain a single whitish, legless, grub or "gentle," about as large round as a goose-quill, tapering to the retractile head, which is furnished with two curved, black, sharp hooks, truncated and concave at the posterior end of the body.

This worm riots in the putrid insect-remains, and when fed upon them to repletion bores through the leaf just above the petiole and burrows into the ground. Here it contracts to the pupa state, and in a few days issues as a large two-winged fly, which I have described in the Transactions of the St. Louis Academy of Science as *Sarcophaga Sarraceniæ*,—the Sarracenia Flesh-fly.

The immense prolificacy of the Flesh-flies, and the fact that the young are hatched in the ovaries of the parent before they are deposited by her on tainted meat and other decomposing or strong-smelling substances, have long been known to entomologists, as has also the rapid development of the species. The viviparous habit among the Muscidæ is far more common than is generally supposed, and I have even known it to occur with the common house-fly, which normally lays eggs. It is also possessed by some Œstridæ, as I have shown in treating of *Œstrus ovis*, the Sheep Bot-fly.

But the propensity of the larvæ for killing one another and their ability to adapt themselves to different conditions of food-supply are not sufficiently appreciated. I have long known, from extensive rearing of parasitic Tachinidæ, that when, as is often the case, a half-dozen or more eggs are fastened to some caterpillar victim only large enough to nourish one to maturity, they all hatch and commence upon their common prey, but that the weaker eventually succumb to the strongest and oldest one, which finds the juices of his less fortunate brethren as much to his taste as those of the victimized caterpillar. Or, again, that where the food-supply is limited in quantity, as it often is and must be with insects whose larvæ are parasitic or sarcophagous, such larvæ have a far greater power of adapting themselves to the conditions in which they find themselves placed, than have herbivorous species under like circumstances.

Both these characteristics are strongly illustrated in *Sarcophaga Sarraceniæ*. Several larvæ, and often upwards of a dozen, are generally dropped by the parent fly within the pitcher; yet a fratricidal warfare is waged until usually but one matures, even where there appears macerated food enough for several. And if the Xanthoptera larva closes up the mouth of the pitcher ere a sufficient supply of insects has been captured to properly nourish it, this Sarcophaga larva will nevertheless undergo its transformations, though it sometimes has not strength enough to bore its way out, and the diminutive fly escapes from the puparium, only to find itself a prisoner, unless deliverance comes in the rupture or perforation of the pitcher by the Moth larva or by other means. This rupturing of the pitcher does not unfrequently take place, for Dr. Mellichamp writes under date of June 27 as follows: —"Most old leaves now examined—I might almost say all—instead of being bored, seem ripped or torn, as if by violence, apparently from without. You see occasionally shreds of the leaves hanging. Surely the legless larva of Sarcophaga cannot do this! What then—toads, or frogs, or crawfish abounding in these moist, pine lands? or rather is not the fat maggot the occasion of the visits of the quail which lately I have observed here?"

These two insects are the only species of any size that can invade the death-dealing trap with impunity while the leaf is in full vigour, and the only other species which seem at home in the leaf are a minute pale mite belonging apparently to *Holothyrus*, in the Gamasidæ, and which may quite commonly be found crawling within the pitcher; and a small Lepidopterous leaf-miner, which I have not succeeded in rearing. There must, however, be a fifth species, which effectually braves the dangers of the bottom of the pit, for the pupa of Sarcophaga is sometimes crowded with a little chalcid parasite, the parent of which must have sought her victim while it was rioting there, as a larva.

But all other insects, so far as we know, tumble into the tube and there meet their death. The moth is doubtless assisted in walking within the tube by the spurs on the legs which it, in common with most other moths, possesses; while the Flesh-fly manages to hold its own by its widely extended legs and stout bristles. Dr. Mellichamp says that when disturbed it buzzes violently about, just as if an animated sheep-bur had fallen into the tube—not apt to go down, because it will hitch and stick, and finally, by main force, it generally emerges, but, once in a while, also succumbs.

Two questions very naturally present themselves here:—(1) What gives the Flesh-fly more secure foothold on the slippery pubescence than the common house-fly exhibits? (2) What enables the larva of the Flesh-fly to withstand the solvent property of the fluid which destroys so many other insects? I can only offer, in answer, the following suggestions: the last joint of the tarsus of the common house-fly has two movable, sharp-pointed claws, and a pair of pads or "pulvilli." These pads were formerly supposed to operate as suckers, and all sorts of sensational accounts of this wonderful sucker have been given by popular writers, who forget that there are any number of minute insects having no such tarsal apparatus, which are equally indifferent to the laws of gravitation so far as walking on smooth, upright surfaces, or on the ceiling, is concerned. In reality, these pads are thickly beset on the lower surface with short hairs, most of which terminate in a minute expansion kept continually moist by an exuding fluid—a sort of perspiration. Take the human hand, moistened by perspiration or other means, and draw it, with slight pressure, first over a piece of glass or other highly-polished surface, and then over something that has a rougher surface, such as a planed board, a papered wall, or a velvety fabric, and you will experience much greater adhesion to the smoother objects, and may understand the important part which these moist pads play in the locomotion of the fly; they also act, in part, like the cushions of a cat's paw in protecting and preventing abrasion of the claws, which are very useful on the rougher surfaces, where the pads are less serviceable.

Now, compared with *Musca domestica*, the claws of *Sarcophaga Sarraceniæ* are much the longest and strongest, and the pads much the largest, presenting three or four times the surface. These differences are, I think, sufficient to explain the fact that while the common fly walks with slippery and unsteady gait on the smooth pubescence (the retrorse nature of this pubescence sufficiently explaining the downward tendency of the movements), its sarcophagous congener manages to get a more secure footing; for not only does the latter present a larger adhesive surface, but the longer claws are more likely to reach beyond the pubescence and the bristles, and fasten to the cellular tissue of the leaf beyond.

In answer to the second question, I can only say that there is nothing exceptional in the power of the larva to withstand the solvent quality of the fluid; it is, on the contrary, in accordance with the facts known of many species of Muscidæ and Œstridæ, some of which, like the well-known horse-bot, revel in a bath of chyme, while others are at ease in the intestinal heat of other warm-blooded animals. It is also well known that they will often live for hours in strong liquids, such as alcohol and turpentine.

To one accustomed to seek the why and wherefore of things, the inquiry very naturally arises as to whether Xanthoptera and Sarcophaga play any necessary or important rôle in the economy of Sarracenia. Speaking of the Sarcophaga larvæ, Mr. Ravenel asks, "May it not do some service to Sarracenia, as Pronuba does to Yucca?" And if so, may not all this structure for the destruction of insects be primarily for his benefit? Can he be merely an intruder, sharing the store of provision which the plant, by ingenious contrivance, has secured for itself, or is he a welcome inmate and profitable tenant? Self-fertilization does not take place in Sarracenia, and the possibility that the bristly Flesh-fly aids in the important act of pollination lends interest to the facts. No one has witnessed with greater pleasure than myself the impulse which Darwin has of late years given to such inquiries; but we should be cautious lest the speculative spirit impair our judgment or our ability to read the simple lesson of the facts. My own conclusions summed up are:—

1. There is no reason to doubt, but every reason to believe, since the observations of Dr. Mellichamp, that Sarracenia is a truly insectivorous plant, and that by its secretions and structure it is eminently fitted to capture its prey.

2. That those insects most easily digested (if I may use the term) and most useful to the plant are principally ants and small flies, which are lured to their graves by the honeyed paths; and that most of the larger insects, which are not attracted by sweets, get in by accident and fall victims to the peculiar mechanical structure of the pitcher.

3. That the only benefit to the plant is from the liquid manure resulting from the putrescent captured insects.

[Mr. Ravenel, in making a transverse section near the base of the young leaf, noticed large tubular cells passing down through tho petiole into the root, and much of the liquid manure may possibly pass through these into the root-stalk.]

4. That Sarcophaga is a mere intruder, the larva sponging on and sharing the food obtained by the plant, and the fly attracted thither by the strong odour, as it is to all putrescent animal matter or to other plants, like *Stapelia variegata*, which give forth a similar odour. There is nothing to prove that it has anything to do with pollination, and the only insect that Dr. Mellichamp has observed about the flowers with any frequency, is a Cetoniid beetle, the *Euryomia melancholica*.

5. That Xanthoptera has no other connection with the plant than that of a destroyer, though its greatest injury is done after the leaf has performed its most important functions. Almost every plant has its peculiar insect enemy, and Sarracenia, with all its dangers to insect-life generally, is no exception to the rule.

6. That neither the moth nor the fly has any structure peculiar to it, that enables it to brave the dangers of the plant, beyond what many other allied species possess.

MICROSCOPY.

New Diatoms.—A new genus and several new species of diatoms have been figured and described by Mr. F. Kitton, of Norwich, in the November part of the *Monthly Microscopical Journal*. The more remarkable forms were found in a gathering made by Captain Perry, of Liverpool. The following are the forms described: — *Perrya*, n. g., forms somewhat resembling *Nitzschiæ*, but are distinguished from that genus by the absence of the more or less marginal keel. The species figured (*P. pulcherrima*) resembles an Indian canoe, the scales of which are much compressed and marked with distant transverse moniliform lines not reaching the edge; between these lines are transverse series of fine moniliform striæ. It sometimes exceeds one-fiftieth of an inch in length. *Nitzschia grandis*, n. s. This is probably one of the most beautiful of the genus. The valve is linear, broad, suddenly tapering towards the incurved apices; keel sub-central, costate, punctate between the costæ; remainder of valve marked with transverse moniliform striæ. Length from ·0100″ to ·0200″. The most magnificent form detected in this gathering was a seven-angled *Triceratium* with large hexagonal cells; the internal surface of valve marked with conspicuous radiating puncta. From observations on broken valves, the author considers that the valve has a thin siliceous plate attached to its inner surface (a very early state of a new valve), upon which occur the radiating puncta, seen when the lower surface of the valve is in focus. Mr. Kitton has named the form *Triceratum Favus*, var. *sept-angulatum*. A new species of Surirella was found in a deposit from New Zealand, which the discoverer thus describes: *Surirella contorta*, n.s. Valve elliptically or slightly ovate, canaliculi fine, numerous; alæ inconspicuous, narrow median elevation terminating in short spines; surface of valve obscurely striate; valve in front view contorted.

Quekett Microscopical Club.—The October number of the Journal of this celebrated club has just been published, and as usual contains several very useful and excellent papers. The most noteworthy are two of a series by Dr. Braithwaite, on the "Histology of Plants," and one by E. T. Newton, F.G.S., of the Jermyn-street Museum, on the "Preparation of Microscopic Sections of Soft Tissues." There are also papers on "How to make Thin Cover Glass," by G. J. Burch; on a "False Light-excluder" for objectives, by J. E. Ingpen, Hon. Sec.; on the "Development of *Hydra vulgaris*," by James Fullagar; and a paper on a "New Form of Section-cutting Machine for the Microscope," by Dr. Hoggan.

The Derbyshire Microscopical Society.—The Monthly Meeting of this Society, which now at the close of the second year of its existence, numbers about forty members, was held in Derby on Thursday evening, the 15th ult., the Rev. J. M. Mello, M.A., F.G.S., President of the Society, in the chair. The President read a paper on "Microscopical Geology," in which he called attention to the great importance to the geologist, as well as the mineralogist and petrologist, of an intelligent use of the microscope in their investigations. It was shown that by its means, in conjunction with the polariscope, it was possible to discriminate between the various minerals which enter into the composition of rocks, even when these minerals take the most minute forms, but that it was possible also to arrive at tolerably clear notions regarding the history of the formations of the rock, and of the individual crystals when present, of which it is composed. It was also shown how much service the microscope rendered in the investigation of the minuter organisms in rocks, many of which were undiscoverable by the naked eye. In a similar way small fragments of a bone, or of a tooth, might be found sufficient to enable the skilled observer to trace its affinities, just as an examination of coal by the microscope had been the means of throwing a large amount of light upon the nature of the plant-life of bygone ages. In the course of the paper the microscopical characteristics of the minerals most commonly met with in the igneous rocks were pointed out, and the whole subject was illustrated by diagrams and by a very extensive display of rock and mineral sections under the microscopes of some of the members present.

Re Society's "Universal Screw." — Mr. Guimaraens, or any one in doubt as to the accuracy of the so-called Universal Screw, of either object-glass or microscope nosepiece, has but to apply to Mr. Reeves, at the Royal Microscopical Society's rooms, and he, with his usual courtesy, will test it with the screw gauges deposited with the Society, which gauges are not likely to have altered from use, as are those of the optician, although in the latter case there is still the formula for their re-adjustment.

ZOOLOGY.

A Variety of Land-shell New to Britain.—I have been fortunate enough during the last few months to find a new and distinct variety of *Clausilia rugosa*, the peculiar characteristics of which were first noticed by G. Sherriff Tye, Esq., of Handsworth, and which has since been kindly determined for me by J. Gwyn Jeffreys, Esq., F.R.S. I send a description of them, as also the remarks made upon this new and rare variety by the same eminent authority, who has kindly favoured me with his opinion respecting them. He considers it to be the variety *Schlechtii*, of Zelebor, whose description of it is published in the monograph of Adolf Schmidt, entitled "Die Kritischen Grappen der Europäeschen Clausilien," 1857, page 40. "Claus. dubia Draparnaud g. var. Schlechtii. Zelebor, *gracilis*, *cerasiora*, *nitidula*, *striatula*, *rarc-strigillata*, *carina* *valida*, Long. 12 diam., $2\frac{1}{4}$–$2\frac{1}{2}$ millim., Ap. $2\frac{1}{2}$ millim. longa, $1\frac{3}{4}$ lata, fig. 94, 95, 198." Mr. Jeffreys further remarks, "I believe this is the same variety which Pareyss of Vienna has named *eximia*, but that name has not been published," adding, "the intermediate gradations between *Clausilia rugosa* and its var. *dubia*, are very numerous." The new variety referred to is apparently confined to one or two spots in the counties of Northumberland and Durham, the best specimens being found in the latter county, in a particular locality, not very far from the coast; they are generally larger, more elongated, smoother, and more transparent than *Clausilia rugosa*, var. *dubia*, the colour likewise different whereas the latter attains occasionally a fine purple colour, and runs generally through the usual shades of brown to purplish-brown, the former appears only in a pale brown form, frequently resembling in external appearance *Clausilia laminata*, both in smoothness and in transparency.—*W. F.*, *Sutton*.

How the Puffin Ascends to its Nest.—In the November number of Science-Gossip there appears an extract from the *Zoologist*, under the above heading, by Mr. H. M. Wallis. As this extract appears to me to be erroneous, and likely to mislead, I shall endeavour, with all respect to Mr. Wallis, to point out the fallacy. In the first place the proper and only answer to the question "How does the puffin ascend to its nest?" is the simplest one that can be given; viz., it flies there. I have frequently observed puffins flying, and all the books to which I have referred speak of the bird as a "good flyer." Besides, bad flyers have their choice to build in rabbit-warrens. If the question were asked about the Great Auk or the Penguins, it might be more desirable to have an answer as to the *modus operandi*, for these birds have only flappers, or we might say "feathered fins," and yet build on high rocks. The paragraph in question goes on to say, "The bird rose from the water some way from the shore, flying so as barely to clear the tops of the waves until within fifty yards from the cliff, when it appeared to *depress its tail*, which was fully spread, and by extending its webbed feet on either side to nearly double the surface of resistance, its course was changed, and the bird *rose* without any apparent difficulty to its nest." If this theory is correct, the Puffin forms a little law of nature for itself. The *depressed* tail and feet spread out would just exactly send the puffin *down* towards the water, instead of *up* towards the nest. The tail of a bird is analogous to the rudder of a ship. The tail being depressed, *impedes* the lower side of the bird, and the bird would turn head downwards, whereas raising the tail would impede the upper part of the bird's body and the bird would turn upwards. Place a large stone under one wheel of a cart when in motion, and the cart will be turned towards the impediment. The same with a boat; the rudder impedes one side and the boat turns in the direction of the impeded side; the same with a bird. Now we see by practice that this is correct, if we observe a pigeon alighting on a road, as it swoops down it spreads out its tail and turns it up. The body immediately balances backwards, *i.e.*, the head turns up and the pigeon alights. The same effect can be seen in the poising of a hawk, or the gyrations of sea-gulls on our tidal rivers. I can perfectly easily account for the error into which Mr. Wallis has fallen. It *appeared* to depress its tail, *i.e.* from his point of view; as the bird sailed upwards the tail *appeared* lower. He considered the depression of the tail the cause of the rising of the bird. He should have taken the rising of the bird as the reason of the apparent depression. I believe the action of the feet described to be quite accurate, and I hope your correspondents will excuse any errors they may discover in either the length or style of this correction.—*C. C. Russell, Newtownards, co-Down*.

Papilio Machaon.—In reply to "H. A. K.," who asks whether it is not curious to find this butterfly miles away from any fen—on the Lion Mound at Waterloo,—I reply that it by no means confines itself to such localities on the Continent. At Freiburg, in Baden, I found a clover-field so full of this species that there were one, if not two, for every stalk of clover. They were all settled; and so intent upon sucking the honey of the flowers that they hardly flew away when disturbed. Wherever I have travelled on the Continent I have found this insect, and its congener *P. podalirius*. In my opinion, no continental specimens come up to the genuine fen ones of England in beauty. The depth of the black transverse band on the fore-wings is not so strikingly delineated, and we may almost call those specimens, which justly stand at the head of our native collections of Lepidoptera, typical varieties of the European species. There is as much difference between them as between the fen *C. dispar* and the *C. hippothœ* of the Pontine Marshes, near Rome.—*J. C. M.*

The Late Dr. Lankester, F.R.S.—It is our sad duty to record the death of another distinguished scientific man. Dr. Lankester, F.R.S., was one of those few men who, in addition to holding a high position in his own profession, was also distinguished for original research, and still more so as one of our ablest and most eloquent popularizers of science. His works are widely known and read, and everywhere highly appreciated. Those who personally knew him will sadly miss his genial and hopeful presence, and his outspoken and concise expression of opinion on scientific subjects. He died in his sixty-first year. To the unscientific public he was perhaps better known as the energetic coroner for Central Middlesex.

BOTANY.

Solanum grandiflorum.—The plant spoken of in your journal by "T. B. W., Brighton," as *Solanum grandiflorum* or *dentatum*, is, I have no doubt, the *Solanum crispum* of Ruiz et Pao. It is a native of Chili, but is quite hardy in this country, and well worth a place in all ornamental gardens and shrubberies. The stem is woody and flexuous, growing twelve or more feet high, but requires some support, as a wall, stake, or, where I have seen it in great perfection, clinging round the stem and branches of a deciduous growing tree. The flowers are pale lavender in large corymbs of great beauty; when crushed they give off a disagreeable perfume, and the whole plant is intensely bitter.—*J. S. T.*

Skirret (*Sium Sisarum*).—The skirret is one of those plants which are now neglected, because we have become acquainted with others more pleasant to the taste and more profitable in their culture. It belongs to the same class as the carrot and parsnip, but differs from those roots in being perennial. It is a native of China, and was introduced before 1548. Worlidge, a writer in the latter end of the seventeenth century, described it as the sweetest, whitest, and most wholesome of roots. The root consists of a cluster of fleshy tubers, which are connected together at the crown or head; each separate tuber is about the thickness of the little finger. They grow very uneven, and are covered with a whitish rough bark, while a hard core or pith runs through the centre. According to Loudon, it was cultivated in the north of Scotland under the name of Crummock. It is grown on the Continent, and much used in French cookery. In China it is reputed to possess peculiar medicinal virtues. Sir James Smith observes that the Chinese have long been in the habit of sending this root to Japan as the true Ginseng of Tartary, or *Panax quinquefolia* of Linnæus, a plant possessing very different properties. (See "Penny Ency.") The skirret abounds in saccharine matter, and a fine white sugar, little inferior to that of cane, has been extracted from it.—*Hampden G. Glasspoole.*

Warwickshire Plants.—An exhaustive and cleverly drawn-up catalogue of the plants collected in Warwickshire in 1873 has just been published by the Warwickshire Natural History and Archæological Society. The catalogue has been compiled chiefly by Dr. R. Baker and the Rev. T. R. Young, both of them well-known botanists. The "London Catalogue" has been followed, and it would be well if all local lists copied this example. The hope is expressed by the authors, in which we fully concur, that the present catalogue may form the groundwork of a county Flora a few years hence.

"Tea Plant."—There is a plant here which is this year covered with scarlet berries. I have seen many plants in this neighbourhood, but never before noticed the berries. These could hardly have escaped attention, as they are very conspicuous, in consequence of the plant being almost destitute of leaves at this season. The one referred to above is trained up the front of a house facing the south.—*G. Hardy, Liverpool.*

GEOLOGY.

A Submarine Forest in the Orwell.—Mr. J. E. Taylor, F.G.S., &c., has made a communication respecting an extensive submarine forest underlying the mud-banks of the estuary of the Orwell, near Ipswich. The bed of the channel was recently deepened, and a stratum of peat passed through to the thickness of five feet. The latter was full of beautiful impressions of leaves, fruits, &c., and trunks and branches of beech, oak, fir, &c. Several fine molar teeth of the Mammoth (*Elephas primigenius*) were obtained from the same bed, in which were found layers of freshwater shells. At present all the mollusca in the Orwell are marine. Mr. Taylor considers this forest as coeval with several other submarine forests which fringe our coasts, and which probably grew before the last depression that separated England from the Continent.

The Comparative Microscopic Rock-structure of some Ancient and Modern Volcanic Rocks.—At the last meeting of the Geological Society, a paper on the above subject was read by J. Clifton Ward, Esq., F.G.S. The author stated at the outset that his object was to compare the microscopic rock-structure of several groups of volcanic rocks, and in so doing to gain light, if possible, upon the original structure of some of the oldest members of that series. The first part of the paper comprised an abstract of what had been previously done in this subject. The second part gave details of the microscopic structure of some few modern lavas, such as the Solfatara Trachyte, the Vesuvian lava-flows of 1631 and 1794, and a lava of the Alban Mount, near Rome. In the trachyte of the Solfatara acicular crystals of felspar show a well-marked flow around the larger and first-formed crystals. In the Vesuvian and Albanian lavas leucite seems, in part at any rate, to take the place of the felspar of other lavas; and the majority of the leucite crystals seem to be somewhat imperfectly formed, as is the case with the small felspar prisms of the Solfatara rock. The order of crystallization of the component minerals was shown to be the following:—magnetite, felspar in large or small *distinct* crystals, augite, felspathic or leucitic solvent. Some of the first-formed crystals were broken and rendered imperfect before the viscid state of igneous fusion ceased. Even in such modern lava-flows as that of the Solfatara considerable changes had taken place by alteration and the replacement of one mineral by another, and is very generally in successive layers corresponding to the crystal outlines. The frequent circular arrangement of the glass and stone-cavities near the circumference of the minute leucite crystals in the lava of 1631 was thought to point to the fact that after the other minerals had separated from the leucitic solvent, the latter began to crystallize at numerous adjacent points; and as these points approached one another, solidification proceeded more rapidly, and these cavities were more generally imprisoned than at the earlier stages of crystallization. In the example of the lava of 1794, where the leucite crystals were further apart, this peculiar arrangement of cavities was almost unknown. The third part of the paper dealt with the lavas and ashes of North Wales; and the author thought that the following points were established:—1. Specimens of lava from the Arans, the Arenigs, and Snowdon and its neighbourhood, all have the same microscopic structure. 2. This structure presents a hazy or milky-looking base, with scattered particles of a light-green dichroic mineral (chlorite), and generally some porphyritically imbedded felspar crystals or fragments of such, both orthoclase and plagioclase. In polarized light, on crossing the Nicols, the base breaks up into an irregular-coloured breccia, the colours changing to their complementaries on rotating either of the prisms. 3. Finely-bedded ash, when *highly altered*, is in some cases undistinguishable in microscopic structure from undoubted felstone. 4. Ash of a coarser nature, when highly altered, is also very frequently not to be distinguished from felstone, though now and then the outlines of some of the fragments will reveal its true nature. 5. The fragments which make up the coarser ash-rocks seem generally to consist of felstone, containing both orthoclase and plagioclase crystals or fragments; but occasionally there occur pieces of a more crystalline nature, with minute acicular prisms and plagioclase felspar. 6. In many cases the only tests that can be applied to distinguish between highly-altered ash-rock and a felstone are the presence of a bedded or fragmentary appearance on *weathered* surfaces, and the gradual passage into less-altered and unmistakable ash. In the fourth division of his paper the author described some of the lavas and ashes of Cumberland of Lower Silurian age. With regard to these ancient lavas, the following was given as a general definition:—The rock is generally of some shade of blue or dark green, generally weathering white round the edges, but to a very slight depth. It frequently assumes a tabular structure, the tabulæ being often curved, and breaks with a sharp conchoidal and flinty fracture. Silica 59–61 per cent. Matrix generally crystalline, containing crystals of labradorite or oligoclase and orthoclase, porphyritically imbedded, round which the small crystalline needles seem frequently to have flowed; magnetite generally abundant, and augite tolerably so, though usually changed into a soft dark-green mineral; apatite and perhaps olivine as occasional constituents. *Occasionally* the crystalline base is partly obscured and a felsitic structure takes its place. The Cumberland lavas were shown to resemble the Solfatara greystone in the frequent flow of the crystalline base, and the modern lavas generally in the order in which the various minerals crystallized out. In *external* structure they have, for the most part, much more of a felsitic than a basaltic appearance. In internal structure they have considerable analogies with the basalts. In chemical composition they are neither true basalts nor true felstones. In petrological structure they have much the general character of the modern Vesuvian lavas; the separate flows being usually of no great thickness, being slaggy, vesicular, or brecciated at top and bottom, and having often a considerable range, as if they had flowed in some cases for several miles from their point of eruption. Their general microscopic appearance is also very different from that of such old basalts as those of South Stafford and some of those of Carboniferous age in Scotland. On the whole, while believing that in *some* cases the lavas in question were true basalts, the author was inclined to regard most of them as occupying an intermediate place between felsitic and doleritic lavas; and as the felstone lavas were once probably trachytes, these old Cumbrian rocks might perhaps be called Felsidolerites, answering in position to the modern Trachydolerites. A detailed examination of Cumbrian ash-rocks had convinced the author that in many cases most intense metamorphism had taken place, that the finer ashy material had been partially melted down, and a kind of streaky flow caused around the larger fragments. There was every transition from an ash-rock in which a bedded or fragmentary structure was clearly visible, to an exceedingly close and flinty felstone-like rock, undistinguishable in hand specimens from a true contemporaneous trap. Such altered rocks were, however, quite distinct in microscopic structure from the undoubted lava-flows of the same district, and often distinct also from the Welsh felstones, although *some* were almost identical microscopically with the highly altered ashes of Wales, and together with them resembled the felstone lavas of the same country. This metamorphism among the Cumbrian rocks increases in amount as the great granitic centres are approached; and it was believed by the author that it took place mainly at the commencement of the Old Red period, when the rocks in question must have been buried many thousands of feet deep beneath the Upper Silurian strata, and when probably the Eskdale granite was formed, perhaps partly by the extreme metamorphism of the volcanic series during upheaval and contortion. The author stated his belief that the Cumbrian volcanoes were mainly subaërial, since some 12,000 feet of ash and lava-beds had been accumulated without any admixture of ordinary sedimentary material, except quite at the base, containing scarcely any *conglomeratic* beds, and destitute of fossils. He believed also that *one* of the chief volcanic centres of the district had been the present site of Keswick, the low craggy hill called Castle Head representing the denuded stump or plug of an old volcano. The author believed that one other truth of no slight importance might be gathered from these investigations, viz., that neither the careful inspection of hand-specimens, nor the microscopic examination of thin slices, would in *all* cases enable truthful results to be arrived at, in discriminating between trap and altered ash-rocks; but these methods and that of chemical analysis must be accompanied by oftentimes a laborious and detailed survey of the rocks in the open country, the various beds being traced out one by one and their weathered surfaces particularly noticed.

NOTES AND QUERIES.

Swarming of Bees.—A friend of mine relates a curious incident in relation to a swarm of bees. The queen bee having settled in a crack in the wall of the house, the whole hive turned out to seek her. They swarmed all around the hole wherein the queen had taken up her abode, and not content with the outside of the house a large number of them came in at the open window of the room above. When at night-time the bees had gone into their usual torpid state, they were swept into a pan and destroyed. The affinity of bees for the queen is well known. Here is another instance which proved to our complete satisfaction that the creatures would prefer to starve and die rather than forsake their sovereign.—*W. S. Palmer.*

A Cat.—Was it Reason or Instinct?—On the 19th of last month a stray black cat was found to have brought forth four kittens, all of which were black. They could only have been a few days old when found, as they were quite blind. Wanting a cat at the time, we thought this a good opportunity to secure one: so we drowned three and left one. The next day, to all appearance, the kitten was found lying dead on the floor under the shelf on which stood the box the mother had used for a bed. Two or three days afterwards one of the servants came in to say the cat had got another kitten from somewhere, and that it could see. On going to look at it, it was found to have moved into an outhouse on the other side of the garden, and had got the kitten in an old coal-shoot on a shelf about five feet from the ground; and inquiring into the matter it was found that the boy had thrown the three dead kittens into the dust-bin, and I think there is no doubt the old cat had brought the dead one from thence, and had left it where it was found, and had moved the living one to its new abode. If this was not done by design, what could have induced her to move only one of the three dead ones? It seems to me that it was something more than what we are pleased to call instinct. It looks very much as if she had been actuated by past experiences, and had thought this the best method to preserve the remaining one.—*J. B. B., Norwich.*

Deiopeia pulchella (crimson speckled).—It may be interesting to some of the readers of Science-Gossip to hear that I have been fortunate enough to take a specimen of this insect at Dover, Kent.—*L. R. Vigers.*

Wasp Duel.—A young lady friend witnessed the following occurrence, and I should be glad if any of our readers could explain it. The other day two wasps were observed furiously fighting; they were rolling over each other on a flight of steps, buzzing all the while in a very angry manner. Presently one gained the victory, and having killed his antagonist, proceeded to dismember him. He bit off a leg or two, and flew away with the abdomen; after about a quarter of an hour he returned, carried the thorax to a leaf close by, and biting off the remaining legs, wings, and head, flew triumphantly off with it.—*A. C. Haddon.*

Gossamer.—I have had an opportunity of witnessing the almost unaccountable extent and comparative density of a shower of this substance. The singular appearance it presented caused much admiration; it corresponded generally with the vivid description given by Mr. White, in his Natural History of Selborne, with respect to the very similar appearance which he beheld in September, 1741. I was called into the garden on the 26th September, at Tedworth, on the borders of Hants and Wilts, purposely to see the "falling shower of cobwebs." The day was such as Mr. White describes, cloudless and calm, and the time, early in the morning. Around, and in every direction, from the higher regions of the atmosphere, were falling flossy flakes and long threads, surpassingly gracefully. They were almost as buoyant as the air; hence the long threads slowly assumed curls and waving undulations, and their tufts of snowy cottony appearance sparkled and glistened in the sunshine like so many stars. Illustrative of this buoyancy, I may mention that one long web, which in particular I tried to secure, and even did touch, rose slowly again into the air and passed over the house. There was no manifestation of the presence of a spider, and we felt almost incredulous that the astonishing number could have been produced as suggested. The more intently one looked, so much the more the number of the webs and the films seemed to increase. Later in the day I had a drive to Andover, which is ten miles distant, and I observed that the hedge-rows by the roadside were thickly covered the whole way, and I have heard from a brother, who journeyed on the same day to Town, from a western part of Wilts, that he noticed the festoons clinging to the telegraph wires of the Great Western Railway until close to London.—*Martha Cape.*

New Zealand Forests.—When I went to Canterbury, New Zealand, in 1852, the settlers were very desirous of rearing about their homesteads some of the beautiful trees and shrubs that composed the native forest. But all attempts at making plantations of those indigenous trees, with the exception of a few small shrubs, either by transplanting or by sowing the seed, were unsuccessful, so much so, that if people were seen carrying home young trees out of the forest, with the view of planting them about their land or the open plains, they were immediately recognized as having recently arrived. When the timber was cleared, the ground used to get covered with a kind of thicket, the least common of the multitudinous flora of the forest. Now the eucalyptus, the oak, elm, and pretty well all English fruit and forest trees, gave promise when I left in 1862, of paying for cultivation. I wish to ascertain from any of your readers who may have recently arrived from the province, whether, as seemed to be foreshadowed then, the New Zealand forest trees are approaching the end of the period allotted to their existence?—*Kaiapoi.*

Anatomy of a Caterpillar. — Permit me to call your attention to the parallelisms contained in W. Tylar's account of the "Anatomy of a Caterpillar," as compared with the description at page 74 of Wood's "Common Objects of the Country." It will not be necessary I think for me to quote the passages or to point out the similarity of the annexed drawing; a reference will suffice to show the truth of my remarks. The only statement for which I cannot find a foundation in the little volume quoted, is that which asserts that the eyes of caterpillars are compound; with reference to which I will only observe that all those I have had an opportunity of examining are simple (*ocelli*).—*A. Hammond.*

The Bridgeman Triple Lantern. — This interesting instrument is, as its name denotes, three lanterns in one body. By an ingenious arrangement it can be converted into a double lantern, which the operator can use while his assistant is preparing the one already removed for phantasmagoria effects. What is more to the purpose, he can be fitting to this either the Oxy-hydrogen Microscope, Polariscope, or the Spectrum Analysis apparatus, which, requiring some little time to adjust, can be done without any tedious delay on the part of the exhibitor; the single lantern is not required to be placed upon the other lanterns for this purpose, but is equally well adapted to work quite distinct from the biunial part of the arrangement. One great advantage is that this lantern has a very wide margin of focal power. The exhibitor can show within 10 ft. of the screen, or at any other distance he chooses up to 70 ft., the several sets of lenses being fitted into telescopic fronts. The supply of the gases to the lanterns is regulated to a very fine degree, by an ingenious arrangement called the "Universal Dissolver," which answers its purpose most admirably, for it is no slight task to regulate the gas-supply of three lanterns, all working at the same time: but by this dissolver, after once starting, all anxiety may be removed, as by the movement of two single levers the whole of the lighting arrangement of the three lanterns is entirely under command.

Ancient Trees.—So many notices of the old trees of different parts of England have already appeared in the recent numbers of Science-Gossip, that I feel it invests those in my own immediate neighbourhood with a greater amount of interest than I have before felt in them. Of these the examples I shall select are most worthy of notice to a general public. The upper waters of the Itchin beautify and fertilize a portion of Hampshire, which (without any of the more striking features of the many popular resorts of the south of England) is well worth visiting for the general and almost universal beauty it presents. The soil is principally chalk, and nourishes almost every kind of tree known to England, and this, too, without undue favour to any one species. The only tree that is uncommon is the Poplar, while to make up for its scarcity, the Aspen, with its beautiful bough-forms, lends an attraction to the scenery. Of old trees the most noticeable is the Gospel Oak (I should like to know how many gospel oaks there are in England) in the parish of Cheriton. In the north-western portion of this parish, and near the boundary of the parish of Ovington, stand the remains of a venerable tree, which is mentioned as a known and ancient boundary in an old manuscript without date in the muniments of the bishopric of Winchester. And again, in a survey taken about the year 1560, and is stated to be so called because "a gospel was wont to be said there in the perambulation week between the lordships of Cheriton and Ovington." Of course the rustics say it is the place where the Gospel was first preached in the neighbourhood, before any church existed. It is computed to be at least five centuries old. At Chilton Condover is a fine avenue of old yews, perhaps not old enough for the antiquary, but certainly of great age. This avenue stretches from the open downs to a small park-like inclosure, with a few old yews in it, and some obscure foundations to mark the site of Chilton Old House. Placed on the northern slope of a bleak hill, and with a sheer chalk soil, no tree but the Yew would thrive, and perhaps we should hardly look for so large a size in such a position as the richer ground of a churchyard or cultivated field would produce. In the churchyard at Itchin Abbas is, or was, an old yew-tree of great age and enormous size. To conclude, at the mouth of the Itchin is a church called Jesus Chapel, but more often known as Pear-tree Church, from an old pear-tree near it. The age of this tree is not known, but two hundred years ago it gave its name, as now, to the green on which it stood.—*T. W. G., Alresford.*

Green Caterpillars.—If "F. R." will watch his currant and gooseberry-bushes very closely next spring, while the leaves are still very young, he will see some of them pierced all over with tiny holes. This is done by the young caterpillars just hatched, and beginning their ravages on the under side of the leaf. I first observed this many years ago. I then destroyed every leaf so pierced, and till about three years ago, when I suppose a fresh importation came in, we have never seen a caterpillar on either currant or gooseberry-tree since.—*M. A. Livett.*

Green Caterpillars.—In answer to F. R.'s inquiry (Science-Gossip, p. 189) as to the best method of exterminating the green caterpillar, which for the last few years has so grievously infested the gooseberry-trees, from personal experience and observation, may I be allowed to say that, in the first place, to pick off every caterpillar as it appears and destroy it, is the best means both of saving the leaves and the fruit; and as a preventive of future mischief to paint the bark of the trees well with a preparation of lime; also at the end of the year dig out the soil round the root some six or seven inches deep, and put in a mixture of soot and lime, with a good layer of freshly-prepared soil at the top.—*E. Edwards.*

Are Elvers young Eels?—This, I suppose, is a question which would puzzle most lawyers, who, probably, never heard of elvers in their lives; but Mr. Frank Buckland has answered it. He was, I believe, requested to appear before the Gloucester magistrates in the case referred to by W. Macmillan in your August number, and gave them the benefit of his knowledge of the subject; and he proved, to the entire satisfaction of the magistrates and all reasonable persons, that elvers are young eels. The case was fully reported at the time—end of May or early in June—in the *Standard*, and is extremely interesting.—*M. A. Livett.*

Lobsters.—I believe it is perfectly true that lobsters occasionally utter screams. When we were staying on the Yorkshire coast some time since, our landlady told me that once when she was going to boil a large lobster, as soon as she put it in the hot water "it screamed like a baby," and jumped out of the pan on to the kitchen floor. Another time, she said, a lobster caught hold of the edge of the table, and she had to get her husband to remove it. My informant had lived near the sea all her life, and was not at all given to exaggeration.—*A. B., Ealing.*

The Name "Tray" as applied to Dogs.—What canine peculiarity or habit could have originated the frequent giving of this not remarkably melodious name to house-dogs in the last century? I don't think it is at all in use now; but so common was it at one time to call dogs "Tray," that in several authors the word will be found to be employed as synonymous with "dog." Perhaps no other name, excepting "Dash," was ever so general, and yet its significance does not appear at first. I do not suppose the word represents the French *trait;* and if then we take it for granted that somehow the tray, a familiar article in household arrangements, got to be associated with the dog, it must have been either because dogs were employed, under certain circumstances, to guard a tray of provisions, or because appetite would naturally lead a dog to be on the watch for scraps when the tray was brought in. Unless, indeed, it can be shown that "Tray" was a corruption of some other word when so used as an appellation.—*J. R. S. C.*

Scirpus maritimus, &c.—In a recent number of Science-Gossip, "J. W." inquires about some Thames-side plants, which inquiries I can perhaps answer. The confusion he complains of is occasioned by certain errors in the "Flora of Surrey" (p. 258), which I had previously noted myself for correction at some future time. According to this work, *Scirpus maritimus* is extremely rare, since it only gives *one* station for it, and that where it was only a casual, whilst on the authority of the editor, *S. triqueter* is "plentiful by the Thames about Putney." The fact appears to be that *S. maritimus* is very common from Wandsworth upwards; I have seen it as far as the Church-ferry at Isleworth, whilst *S. triqueter* is found far more sparingly. I have only seen two patches of it in the parts I have searched. The readiest mode to distinguish the three *Scirpi*, which are generally met with near Putney, is as follows:—In *S. triqueter* the few *pale* sessile spikelets are inserted near the top of the *light* green triangular stem, which has its angles produced almost as if winged; *S. maritimus* has, it is true, acute angles, but which angles are not what I have called produced, whilst the *dark* green stem, with its many leaf-like bracts and chocolate-coloured spikelets, renders it very distinct in appearance from the foregoing; *S. carinatus*, abundant opposite the "Crab-tree," and may be distinguished from *S. lacustris* (which it closely resembles) by its bluntly three-angled stem and upright bract beneath the panicle (Sm. E. Fl., i. 60). If "T. W." still has any difficulty, I shall be happy to show him my specimens from this locality.—*B. D. Jackson*, 30, *Stockwell-road, S.W.*

Viper-bite.—I for one having taken part in the "discussion," am much interested by the account quoted by W. MacMillan, and glad to find that it was recorded in the Dorset newspaper, where, doubtless, it must have met the eye of some gentlemen, who contradicted my assertion in Science-Gossip, a few years ago, that the bite of a viper was very poisonous, and had in some cases proved fatal. I have within the last few years heard of other cases—more recent ones—where the bite has caused death, and I narrowly escaped a bite last summer from a very fine specimen. My son had been out with other boys "snaking" and brought home a reptile in a large, wide-necked bottle; the weather was cold, and the creature seemed quite harmless. I handled it, so did he, and we returned it to its glass cage, having put some plucked grass in with it. Towards evening on the following day the snake seemed to wake up; the heat of the room had cheered it, and on consulting Mr. Cooke's book of "British Reptiles," we found that we had really, not figuratively, been fostering a viper.—*Helen E. Watney.*

Names of Birds.—In Science-Gossip for 1873, p. 143, you were good enough to publish a query of mine respecting some southern sea-birds, of which I could only, at that time, give a few exceedingly imperfect descriptive notes. Since then I have met with further memoranda on the subject, and have had, moreover, an opportunity of identifying all the birds inquired after, as follows: 1. Mollymawk (*Diomedea melanophrys*);* 2. Stinkpot (*Procellaria gigantea*);† 3. Parson-bird (*Procellaria conspicellata*);‡ 4. Ice-bird (*Prion turtus*);§ 5. Whale-bird (*Prion vittatus*).|| Like all names given by unscientific observers, however, these sailors' designations are very loosely applied, and furnish no guide whatever to species. The birds called "white-bellies" in the North Atlantic Ocean, which were asked about at the same time, are guillemots, the common guillemot, *Uria trole.*—*H. G.*

Chaffinch and Missel-Thrush.—Can any of your readers inform me if the Chaffinch, Piedfinch, Pink, as it is sometimes called, is to be found wherever the nest of the Missel-thrush is located? "As in many parts of France it is a general belief amongst the peasants and bird-nesting urchins, that *no* nest of the Missel-thrush is ever found

* Gould, "Birds of Australia," vol. vii. Pl. 43.
† Ibid. Pl. 45. ‡ Ibid. Pl. 46.
§ Ibid. Pl. 54. || Ibid. Pl. 55.

without there being one of a Chaffinch hard by, often on a branch of the very same tree, and the reason assigned is that the Chaffinch seeks the protection of the Missel-thrush from hostile birds, especially the Magpies, which, as every one knows, are allowed to do pretty much as they like in most parts of *that* country, the Chaffinch on its part giving early warning to the Thrush as soon as the common enemy approaches to pilfer any unprotected eggs." We are inclined to think the above statement may be correct, as in the early spring of this year, while walking through our plantation with a gentleman friend, curious in the matter of birds and their nests, we startled what we thought was a chaffinch, from its peculiar cheery sweet note; it evidently did not wish us to find its nest, as it decoyed us amongst the shrubs some distance without our being able to discover its whereabouts. Now, as the Missel-thrush has built for many years in our garden always two, and sometimes three nests, I think it is very probable that the above anecdote from "Cassell's Egg Collection" may be correct. Perhaps I ought to state the Latin name for the Chaffinch is *Fringilla cœlebs*, the latter name, or rather I should say, the specific name being given on account of the separation of the sexes at one period of the year. White, in his "History of Selborne," says that in his neighbourhood, towards Christmas, vast flocks of chaffinches appear in the fields, most of whom are the *hen* bird—at least fifty to one. *Linnæus* remarks "all their hen chaffinches migrate through Holland into Italy." In hard winters no females are seen in North Staffordshire.

Reptiles swallowing their Young.—Meeting with two intelligent men the other day, whose knowledge of Natural History was, I found, rather above the average, I questioned them as to their belief in the above, and they both unhesitatingly expressed their firm conviction of its truth. One of them had resided for a considerable time in a viper country, and had had many sheep killed by the bites of these reptiles; he therefore knew a great deal as to their habits, but was obliged to confess that he had never met with an instance of their swallowing their young alive. The other man, whose knowledge of vipers was more limited, advanced what was to me an entirely new assertion, viz., that the common snake (*Natrix torquata*) swallows its young when the latter are in danger.—*W. H. Warner, Kingston, Abingdon.*

The Large Tortoise-shell.—This morning (July 16, 1874), I observed a number of the large Tortoise-shell butterfly (*Vanessa polychloros*),—so many, at first, as twelve dotted all over the pinkish flowers of the Orpine everlasting (*Sedum Telephium*), which edges one of the flower-beds in my town garden. We first saw them about nine o'clock. During the day they increased considerably, were on nearly every flower-head, and now, at half-past four, they have risen in quite a swarm, and are resting in numbers on the brick walls of my husband's office, and on several shrubs. They seemed as if only lately emerged from the pupa state, so fresh and brilliant in colour. I cannot account for their appearance, as I found neither caterpillars nor chrysalides of this particular butterfly, either during the autumn of 1873 or this past spring, though finding numbers of others; amongst them those of the Tiger-moth, whose favourite food, I may here remark, seems to be the spotted-leaved dead-nettle, *Lamium maculatum*. I reared eight of these caterpillars on it this season, and they have passed through their several stages successfully: and one splendid moth has just deposited over fifty eggs on the bell-glass of my insect vivarium. One May evening, about thirty years ago, I saw several of another species of butterfly, the Orange-tip (*Euchloe cardamines*), asleep on a rose-bush, and very lovely they looked; but a swarm like that of this afternoon I never saw, and can give but a faint idea of the beautiful begemmed flower-border, covered as it was with their outspread wings, glistening beneath the mid-day sun. Can the presence in my garden of all these winged beauties be attributed to its being, like that of "Lady Corisandes," confined to old-fashioned, sweet-smelling flowers, such as stocks, campanulas, and other dear old friends, which were my childhood's admiration? and even now they charm me more than the present system of gardening, though it has such wealth of glorious colouring both of flowers and foliage.—*H. R. B., Limerick.*

The Eagle at Dare.—I see in a late number the so-called golden eagle at Dare, in Somersetshire, has again made its appearance, where it was first mentioned by Mr. Gifford in Science-Gossip for 1872. I soon after sent you a note asking for further particulars and some description of the bird; and about the same time "G." wrote, throwing doubt on the identity of the bird. Neither of these notes were answered in Science-Gossip, and I have not been able to go over and see the bird myself, but two ornithological friends of mine have seen it, and from their description there can be no doubt about it, that the bird is a young white-tailed eagle, as the tarsi are bare of feathers; in the golden eagle, as you know, the tarsi are at all ages feathered down to the junction of the toes. This distinction of itself is sufficient to settle the question at any time as between the white-tailed and the golden eagle, and can hardly be mistaken by any one who looks at the birds for the purpose of identification. —*C. S.*

Centaurea calcitrapa.—Whilst out on my usual rounds I was attracted by some yellow patches in a field of lucern. I thought at first that they consisted of hawkweed picris, but they appeared too gaudy. On reaching them, I found to my surprise that they were most luxuriant plants of *Centaurea calcitrapa* with brilliant lemon yellow-coloured blossoms. *C. calcitrapa* is abundant here, but I have never found it with other than pink flowers. Will any of your correspondents kindly say if the yellow variety is found elsewhere? I shall be pleased to forward a specimen to any subscriber to Science-Gossip on receipt of stamped envelope.—*Dr. Morton, New Brompton, Kent.*

Cats' Imitation.—A gentleman of Falmouth informs me that his dog (like many others) has been taught to beg for a bone, sitting on his haunches and bending his fore paws. His master was lately surprised to see one of his cats, having observed the success of the dog's attitude, imitate it. Another cat followed the example of its much younger companion. Such a copying by one animal of the acquired habit of another of a different genus seemed worthy of notice.

Swarms of Ants.—Did any of the readers of Science-Gossip notice on Wednesday, the 19th of August, the vast swarms of ants (winged and ordinary) which covered the ground in large patches? I shall feel obliged if some one will tell me the reason of this phenomenon.—*J. L. J.*

NOTICES TO CORRESPONDENTS.

E. Lovett.—Your specimen of fern was forwarded to a good authority on such matters and returned with the remark that nothing could be made of so small a fragment. Please send a perfect frond if possible.

J. Colson.—The plant forwarded to us is an unflowered specimen of *Erica cinerea*, whose flowers had been metamorphosed into tinted leaves.

J. W. Jeans.—Your specimen is the common Centaury (*Erythrium centaurium*).

Dr. G. D. Beatly.—Thanks for the slides, which arrived safely. The staining is most beautiful; we have seen nothing to equal it. Article will appear next month.

F. S. Sheldon.—For information as to the Ray Society apply to the Secretary, Somerset House, London.

C. V. G.—The fungi inclosed in match-box arrived in too smashed a condition to be identified.

H. A. S.—The "Epidemic," as you call it, which has set in in your aquarium and killed your gold-fish, &c., is probably a micro-fungus, called *Achyla prolifera*. There is no remedy, and your best plan will be to clean out the glass.

C. Wood.—The small insects inclosed in quill are bird-lice (*Mallophaga*).

C. F. G.—For description and figure of the cast of the British gold coin sent, see Thomas Wright's "Celt, Roman, and Saxon." *Trichodectes* is a genus of parasitic insects, belonging to the family *Mallophaga*. Antennæ triarticulate; tarsi with a single claw. All the species live only on mammalia. *Hæmatopina* have tarsi uni-articulate, with single arcuate claw; parasitic on man and other animals.

J. W. Willmik.—The head of the common sparrow with elongated upper beak is a very remarkable specimen.

H. P., Ashbourne.—*Aulacomnium palustre*, *Tortula fallax*.—R. B.

R. R., Selkirk.—1. *Hypnum sericeum*; 2. *H. molluscum*; 3. *Rhacomitrium lanuginosum*; 4. *Tortula ruralis*; 5. *Fissidens adiantoides*; 6. *Hypnum denticulatum*.—R. B.

J. Cooper.—The "scarlet substance" on the back of Coltsfoot leaf is a micro-fungus called Coltsfoot Rust (*Coleosporium tussilaginis*).—M. C. C.

Dr. B. L.—Your specimen is *Puccinea malvacearum*; there is not the gelatinous element of *Podisoma*.—M. C. C.

Corrigenda.—For fig. 173, p. 253, "Cœlacanthus," read "Acanthodes." Page 254, line 34, for "*four*, viz., one dorsal, *one* pectoral, *one* ventral, and one anal," read, "*six*, viz., one dorsal, *two* pectoral, *two* ventral, and one anal."—W. H. P.

W. C.—We are much obliged for your specimen of *Roccella fuciformis*.

T. Green.—Your packet of foraminiferous sand arrived safely; please accept our thanks for it. In the neighbourhood of March we have some of the most recent of post-glacial marine sands, of which we believe the bed containing the foraminifera to be a member. Consult Professor Williamson's "Monograph of British Foraminifera." The commonest of the fossil forms appears to be *Rotalina*.

M. J. Murton.—It would seem as if the box were attacked with the fungus known as "Dry Rot" (*Merulius lachrymans*). The only way to arrest its ravages is by applying corrosive sublimate, or a solution of zinc.

W. Bradley.—The "Fairy Circles" occupied by fungi which you describe are probably caused by the *Marasmius oreades*. See "Half-Hours in the Green Lanes," p. 318. *Carduus eriophorus*, although not a common plant, is not to be considered rare. It grows in Suffolk in several places rather plentifully. *Carduus nutans* is a common plant.

EXCHANGES.

Well-mounted Diatomaceæ, Zoophytes, Palates, Sections, Spiculæ, &c., for mounted Parasites, showing all the legs.—John Boyd, Victoria-park, Manchester.

Well-mounted Diatoms, for other equally good Slides. Send exchange list.—J. R., 288, Blackburn-road, Bolton.

A Scotch moss-collector would be glad to exchange with English collectors.—Address, J. R. S., Office of Science-Gossip.

Fine Fruiting Specimens of *Roccella fuciformis* for Characteristic specimens of *Roccella tinctoria*, or *Parmelia sinuosa*, &c.—W. Curnow, Pembroke Cottage, Newbyn Cliff, Penzance, Cornwall.

A Piece of Wing-case of Mexican Diamond Beetle, for good Material. Send list.—T. Gardner, Queen's-road, Walford.

Wanted, *Ianthina communis*, *I. Britannica*, *I. pallida*, *I. exigua*, *Mya truncata*, *Mactra stultorum*, *Venus fasciata*, for other Shells, Microscopic Slides, or Material.—F. R. M., 97, Union-street, Torquay.

For Packet of Pure Foraminiferous Shells, send good Mounted object of interest to James Green, March.

Good Microscopical Slides for others, or for good unmounted Material. Lists exchanged.—R. H. Philip, 23, Prospect-street, Hull.

For Seeds of Ice-plant, send stamped directed envelope to W. H. Gomm, Somerton, Taunton.

Rare Shells Offered: *Clausilia rugosa*, var. *Schlechtii* (new and rare variety recently determined by Mr. Jeffreys); *Helix obvoluta*, *H. revelata*, *Limneus glutinosus*, *L. Burnetti*, *L. involutus*, for—*Succinea oblonga*, *Acme lineata*, *Pupa Venetzii*, *P. pusilla*, *P. substriata*, *P. alpestris*, or named good Marine Specimens.—W. F. Sutton, Gosforth Grove, near Newcastle-on-Tyne.

For Fungi from Melon, mounted, send well-mounted Slide to H. C., 24, Rodney-street, Liverpool.

For Injected Section of Fœtal Human Lung, mounted, send well-mounted Insects. A few others to exchange.—Tylar, 165, Well-street, Birmingham.

Aglaophenia pluma with Corbulæ (unmounted), and several of the Sertulariidæ offered for other Hydroids. *S. fusca*, *S. filicula*, and *D. rosacea* most desired.—Miss Donagan, Handel House, Haverstock Hill, N.W.

Members of the Belfast Naturalists' Field Club are prepared to exchange Microscopic Slides, Botanical and Geological Specimens from the north of Ireland.—Address Wm. Gray, Secretary, 6, Mount Charles, Belfast.

Dried specimens of *Gentiana verna* for specimens of Botany, Conchology, Entomology, Geology, or Microscopic Objects.—Rev. J. M. Hick, Newburn, Scotswood-on-Tyne.

L. glutinosa for *L. Burnetti*, *L. lacustris*, or *Vertigo alpestris*.—J. Fitz-Gerald, 10, West-terrace, Folkestone.

A Few Good Slides for Foraminifera from Dog's Bay, &c., unmounted.—J. Carpenter, Turner's Hill, Cheshunt.

For 82, 123, 733, 1040, 1480, 1504, Lond. Cat., 7th Edition, wanted any of the following: 123, 127, 693, 737, 746, 1335, 1482, 1485.—Rev. F. H. Arnold, Fishbonrne, Chichester.

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Flint-flakes, with other Worked Flints, Arrow-heads, &c., from the north of Ireland, for similar Specimens from other localities.—William Gray, Mount Charles, Belfast.

A perfectly pure gathering of *Navicula humerosa*, well mounted and prepared, for good Slides or Material.—Send lists to H. B. Thomas, Boston, Lincolnshire.

British Examples of *Unio tumidus* and *pictorum* wanted; other Land and Fresh-water Shells offered.—Harry Leslie, 6, Moira-place, Southampton.

Primula Scotica for other plants.—Joseph Neil, Drumgelloch by Airdrie, N.B.

Peristome of Funaria (to show Hygrometric experiment), Pollen of Mallow, Citric Acid, &c., for other well-mounted Slides.—J. C. H., 61, Fenney-street, Broughton, Manchester.

Eggs of Fowl Parasite, *Menopon pallidum* (mounted), for any other Slide; Parasites preferred.—Edward Lovett, Holly Mount, Croydon.

Well-mounted Micro Objects offered for mounted Parasites, all kinds.—Send list to T. Curties, 244, High Holborn, London.

For *Œcidium Thesii* send good unmounted Object for inch (not polar) to W. Sargant, jun., Caverswall, Stoke-on-Trent.

BOOKS, &c. RECEIVED.

Newman's "British Butterflies" and "Moths" (2 vols. in one). New Edition. London: R. Hardwicke, 192, Piccadilly.

"On Protoplasm." By James Ross, M.D. London: R. Hardwicke.

"Grevillea." November.

"Monthly Microscopical Journal." November.

"American Naturalist." October.

"Canadian Entomologist." October.

"Journal of Applied Science." November.

"Animal World." November.

"Les Mondes." November.

"Land and Water." November.

Correspondence Received up to 12th ult. from:—M. C.—K.—J. R.—J. S. T.—E. B. W.—H. E. W.—C. V. G.—J. R. S.—T.—F. R. M.—H. P.—J. P. C.—T. H.—J. B.—W. S. P.—J. C.—J. R. S. C.—J. T.—J. M.—H. C.—T. C.—C. D.—R. G.—W. T.—Capt. F. H. L.—T. W.—C. F. G.—J. G.—K.—F. S. S.—J. P.—R. W.—B. W.—H. A. S.—T. B.—W. M.—J. B.—C. C.—H. B. T.—W. S., jun.—J. I. P.—R. B.—M. C. C.—R. D.—D. J.—C. C. R.—H. L.—T. G. W.—G. H.—J. A., jun.—W. B.—W. H. G.—J. N.—E. J. H.—J. C. H.—E. L.—R. H. P.—W. H. P.—W. F. S.—H. B. B.—J. C.—F. H. A.—W. G.—J. M. H.—J. F. G.—G. P.—E. W.—W. I. H., &c.

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