SCIENCE
GOSSIP.

HARDWICKE'S

SCIENCE-GOSSIP

FOR 1875.

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Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

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PREFACE.

WITH that exceeding swiftness which characterizes the flight of time after we have passed a certain stage, we have come to the close of another year.

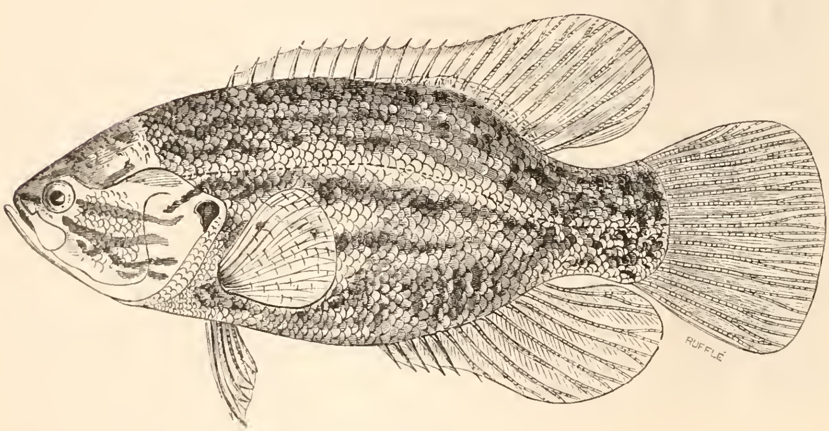
To Science-Gossip it has been the most sadly eventful in its history, for the clear head and brave heart which originated it are silent and still. Few men had a more direct means of getting at the hearts of others than the late Publisher of this Magazine. We are not surprised, therefore, that his death was so sincerely and extensively mourned.

It is much consolation to those whom he left behind to find that his memory is so greatly respected. To all those of our readers and contributors who tendered their condolences (and they were many), we beg to offer our warmest thanks.

The Magazine, which for years was the pet journal of the late Publisher, will be carried on under the same Editorship. Our only care will be to make it still more worthy of the large circulation it now enjoys, and which has never before been equalled. Next year we hope to produce in our pages such additional "bill of fare" as will keep up the interest so extensively felt in our Magazine.

To all our Contributors, and also to the many scientific friends who are always so willing to help us with their counsel and practical assistance, we offer our grateful thanks; whilst, with the figurative right hand of fellowship, we wish all those with whom we are brought into unseen monthly relationship—

"A Happy New Year!"



LIST OF ILLUSTRATIONS.

ON PRESERVING PLANTS.

By JAMES BRITTEN, F.L.S., &c.

WE will assume that our collecting for the year has come to a close: that the long evenings are beginning, and that our dried plants have been brought together from their temporary resting-places to be revised and selected from, so that they may be intercalated in their places in the herbarium, if we already possess one, or, if we are as yet quite novices, that they may form a nucleus around which the whole British flora shall be gathered in due course. First of all, we must make all necessary preparations for—

Mounting, the first essential to which is paper. Much of the neatness of a herbarium depends upon its uniformity, so that it is desirable to lay down a definite plan at the beginning and to act up to it consistently. Amateurs often spoil specimens which they have collected and preserved with considerable care by transferring them from one sheet to another; from books—but it is only *very* amateur botanists who keep their plants in this way!—to loose sheets, from small paper to large, and so on; each change being attended with some slight damage to the specimen so treated. It is, I believe, the common practice on the Continent to keep the specimens loose in folded sheets of paper; but this plan is not followed in England, and, although advantageous as permitting the fullest examination of the plant, it is attended with much risk to the specimens in the way of breakage; so that we may consider it settled that we are going to fasten our plant down upon a sheet of paper. This must be rather stout, and large enough to admit the full representation of the species. The sheets used at the Kew Herbarium are $16\frac{1}{2}$ in. long by $10\frac{1}{3}$ in. wide; those employed at the British Museum are $17\frac{1}{2}$ by $11\frac{1}{4}$ in.; but the former will be found amply sufficient for our purpose. The next consideration is the means by which the specimens are to be secured, which are more various than might at first be supposed. Some persons sew them to the paper; others place straps over them, which are secured with small pins; but the choice practically lies between fixing the whole specimen to the paper with gum, paste, or glue, or securing it with straps of gummed paper. The former plan, which is that adopted at our great public herbaria, is certainly better for specimens which are likely to be much consulted; but the latter is in some respects more satisfactory, if somewhat tedious, as it admits the removal of the plant to another sheet if necessary, and delicate portions, such as thin petals or leaves, are not injured as they are when gummed down. At the British Museum and Kew a mixture of gum tragacanth and gum arabic (the former dissolved in the latter) in about equal parts, is used for this purpose; but very coriaceous specimens are secured with glue at the last-named establishment, while in the former the stems and ends of branches are usually also secured with straps. When the specimen is entirely gummed down, it is a good plan to keep a few extra flowers or fruits in a small capsule attached to the sheet: these will be useful if it is required to dissect such portions, and the specimen need not be injured for such purpose.

Poisoning.—Some persons are in the habit of employing a solution of corrosive sublimate for the purpose of washing over their plants when mounted, and so preventing the development of animal life. The solution in use at the Kew Herbarium is composed of one pound of corrosive sublimate, and the same quantity of carbolic acid to four gallons of methylated spirit; this fulfils the purpose for which it is intended very well, but is somewhat disagreeable to use. At the British Museum it is found that the presence of camphor, frequently renewed in each cabinet, is sufficient to prevent the attacks of insects. It will soon be discovered that some plants, such, for example, as the *Umbelliferæ* and *Grossulariaceæ*, are peculiarly liable to such attacks; and these orders must be inspected from time to time, so that any insect ravages may at once be checked. Damp is to be avoided in the situation of the herbarium, as it favours the development not only of insects but of mould, and renders the specimens rotten.

The question of LABELLING is of some importance, especially to those who value neatness and uniformity in the appearance of their herbarium. One or two sets of printed labels for this purpose have been issued, but they cannot be recommended. They give more than is necessary, — *e.g.*, the English, or more correctly, the book-English names, the general habitats, and definite localities of rare species, and allow very insufficient space for filling in the date and place of collecting, the name of the collector, and such remarks as occasionally occur. The plan of writing all necessary information upon the sheet itself is a good one; but those who prefer a uniform series of labels, will find that a form like the following is as useful as any which they can adopt, and includes all necessary information. The size here given will be adequate for almost all requirements, and is a "happy medium" between the small tickets upon which we have animadverted, and the enormous ones with which some botanists think it necessary to accompany their specimens. Care should be taken to avoid the possibility of a misplacement of labels; many serious blunders have arisen from the neglect of due precaution in this matter.

Herb. John Smith.

Ranunculus acris, L.

and R. Steveni, Reich.

LOC. Meadows near Barchester.

DATE, June 30, 1874.

COLL. John Smith.

ARRANGEMENT.—The plants being now affixed to their respective sheets and duly labelled, are ready to be placed in covers, and rendered available for ready reference. Each genus will require a separate cover, which may well be of somewhat stouter paper than that on which the plants are mounted: the name of the genus should be written at the left-hand-corner, followed by a reference to the page of the manual by which the plants are arranged, or to the number which it bears in the "London Catalogue," if that be employed in their arrangement—a purpose

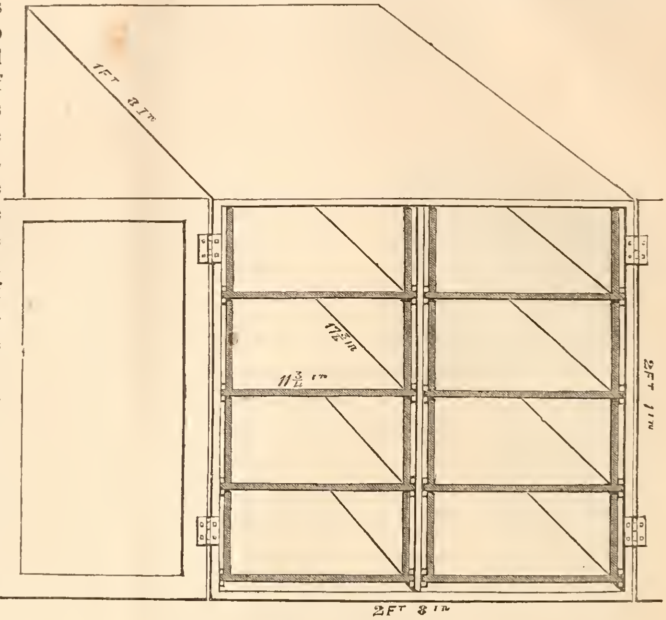


Fig. 1. Cabinet for Herbarium Sheets.

for which it is very suitable. Should the species be represented by more than one sheet, it is convenient to inclose each in a cover of thinner paper, which may bear the number assigned to the plant in the right-hand corner; and it is also convenient to write the name of the plant at the bottom of each sheet, and to number it also in the right-hand corner. These details may appear trivial, but they in reality affect in no small degree the readiness with which any species may be referred to. Should the plants be arranged in accordance with the "London Catalogue," a copy should be kept with the herbarium, in which the plants should be ticked off, so that it may serve as a catalogue of the species represented.

CABINETS.—It will of course be necessary to provide some accommodation for our specimens, and for this purpose we shall find no better model than the cabinets in use in the Botanical department of the British Museum. The accompanying figure (drawn to scale) is an exact representation of one of these. The measurements can of course be modified so as to suit the size of the herbarium sheets. Each shelf is a separate drawer, which, with its contents, can be taken out and replaced at will. Two cabinets such as that figured will be found amply sufficient to contain a very good British herbarium. At Kew the cabinets employed are somewhat similar, but their height is greater and the shelves are fixed.

The above are the principal points connected with the arrangemeut of a herbarium, considered as distinct from the work of collecting. It is possible that I may have omitted to touch upou certain details which may occur to the amateur; should such be the case, I may add that I shall be happy to supply any additional information, either by letter or by word of mouth; or to show the system adopted at the British Museum to any one who may call upon me there for further hints upon the subject.

"FROST PHENOMENA," AND EVAPORATION FROM ICE.

REFERRING to Mr. Mott's paper in SCIENCE-GOSSIP, I have for many years been familiar with the tendency of hoar-frost crystals to point towards the wind, and, have mentioned it iu, as well as out of print. I have found, too, that most farmers and sportsmen kuow that the windward side of a hedge affords, on a frosty morning, a whiter background for a shot thau the opposite side; though they have not in general been aware, until shown the cause, that such superior whiteness was owing to this behaviour of the frost-crystals; and, ou the other hand, others would not believe in the *piling on* process, spite of clear proof; but said the "wind must have changed," &c. Eveu Professor Tyndall seems to have been mistaken on, not exactly this, but on a closely similar point; for in the *Saturday Review*, Jan. 1861, in speaking of the icy *plumage* seeu, in the late severe frost, on the exposed parts of the huts on the top of Suowdon, he describes it as "snow drawn out by the wind into the perfect resemblance of *feathers;*" but he evidently did not see it in actual course of formation, as I was fortunate (?) enough to do in 1867 in manner now to be described.

Many of our readers will remember the severe "Blackthorn winter" of that year, which after a warm, almost hot, fit of spring, set in suddenly on the 12th of May, and included *Hermit's* snowy Derby day. On the 13th I fixed on the top of Y-Glyder-fach, four miles E.N.E. from, and 350 ft. lower than the summit of Snowdon, an Elliott's minimum self-registeriug thermometer; which by the way, unlike those fixed on Snowdon, is still unmolested and in good order, its readiugs having been repeatedly taken during the past seven years.

In the ascent I had eutered, at about 2,000 ft. high, a dense cloud-stratum borne at a good 20 miles an hour ou the wings of a bitter nor'-easter, and met with new-fallen snow, six or eight inches deep on average, but as many feet deep in holes and drifts. The temperature here was 32°, decreasing to 26° as I rose higher, still in dense cloud, but no snow falling. Near to and at the summit, the wondrous crag and block structure of this little-known peak was profusely beset on the salient windward angles with a beautiful growth of icy plumage in rows and groups of feather-like crystals two or three inches long, stouter in their build than those of hoar frost, but, like the latter, set so point-blank *towards* the wind, E.N.E., that I no longer needed to use the compass.

I send with this printed and other slips for editorial satisfaction as to my having years ago recorded the above-named tendency of frost crystals; but I may add that in dead calms,—*e.g.*, the intense frost of Dec. 24-25, 1860,—the spiculæ tend rather to radiate *à la* bottle-brush, round twigs, &c., than to "fall to the ground and thence grow upright." For some days before the date last meutioned there had been, owing to the increasing dryness of the air, but little hoar frost; yet the extreme cold of that Christmas eve overtook and passed the dew-point, low as it must have been; aud the result was a precipitation of rime so profuse as to produce, in S. Derbyshire, a fairy-like scene not to be forgotten. The fine old elms overtopping the tower of the village church were *encrusted* radially, not merely edged or fringed, to their highest twigs, with a frost-growth nearly an inch in diameter, their heads looking like huge growths of white coral against the bluest of wintry skies.

It is not necessary that hoar frost should always accrete from an intermediate state of visible watery particles, or mist; the clearest air may, often does, deposit its moisture as dew or (if frosty) rime, on objects sufficiently cooled by radiation; and there need be no "falling of watery particles" so as to cause "upright frost-growth," which may, of course, take place under special couditious, though I never saw it except as included in the radial growth of a calm frost.

Conversely, ice can, and often does pass (without thawing I mean) from the solid to the invisibly dissolved state; or iu plainer Euglish, ice evaporates at temperatures below 32° Fahr.; and at 24° to 26°, with a brisk wind, the process is quicker than one would expect. To convince an unbelieving scientific frieud, I once put it to direct proof by balancing in a delicate pair of scales a piece of ice of about two ounces weight and forty square inches surface, in a north aspect and a stiff north-east wind at a temperature not exceeding 26°. I have not the figures at hand, but remember that in three minutes the balance turned, and in three hours the ice "kicked the beam."

At school we used to make slides by pouring water over a flagged pavement in a north aspect; and knew well how they would "dry up" in a strong wind, though with hard frost, so that at noon it was necessary to look out for *trips* where all was right three hours before.

H. B. BIDEN.

THE FERN-OWL, OR NIGHT-JAR.

(*Caprimulgus Europæus.*)

THIS little, half-alien bird, which has as many names in the different counties of England as the gipsies have in the various countries of the world, presents us with peculiarities sufficient to excite our curiosity and attention. Many years back we found a fern-owl lying dead in the path of one of the oak-woods in which our part of England abounds, and an old beldame we met had the honour of giving us our first ornithological lecture, by observing that the creature had the widest mouth but the smallest bill of any other bird; she might have added that it has also the finest moustache, for such is the fact, and possibly the largest eye, size for size. The moustache is in the shape of a row of

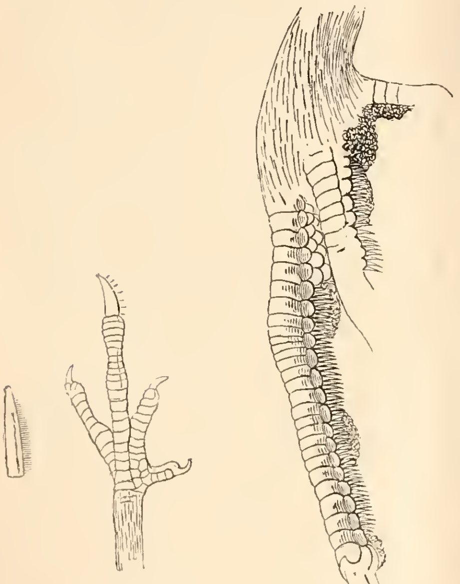


Fig. 2. Comb-like structure of middle toe of Night-jar.

Fig. 3. Pectinated claw of Squacco Heron.

Fig. 4. Pectinated toes of Black-cock.

about seven tapering, stiff bristles, with a few smaller ones, projecting from the upper mandible on each side, no doubt facilitating the prehension of the night-moths and other insects on which the bird feeds. It has been thought that it is to preen these bristles that the curious organization of the nail of the long middle toe (fig. 2) is adapted. Gilbert White believed that he had seen the bird catch its prey with its foot, and thence deliver it to its mouth, and it was to hold this prey securely that he was disposed to look for the use of the part in question. Wilson supposes this pectinated claw not only to act as a comb for the moustache, but also that it is used to clear the animal of vermin about the head, where the beak cannot come. It has also been supposed to separate the elytra of the beetles which the animal swallows; but we have found the bird's gizzard stuffed with beetles of the largest size, and which still retained both their elytra and heads; others have supposed that the pecten has its principal or sole use in perching, and we suspect this to be nearer the truth. It is well known that the bird mostly flies at twilight or early dawn, and that it is dazzled and confounded in broad daylight, though it has the power of covering its eyes with the *membrana nictitans* or third eyelid. In the daytime it may be almost caught with the hand, so confused is it. Last summer but one a night-jar which had been aroused in the middle of the day fell into the tender of an engine at the Trentham Station, and was kept alive some days. It was noticed in the living bird, and, indeed, as much has been noticed before, that it did not perch crossways on a stick, but lengthways; and still further, that in perching the feet were placed one before the other, and not side by side. We find that the hind toe is not, as is often described, reversible, but that it is neither directed backwards, as in most birds, nor forwards, as in that somewhat similar species the Swift, but inwards, much like a thumb, and therefore well adapted to cling to a bough, on which the bird may be often seen longitudinally crouching, the head depressed, and the tail somewhat elevated, and watching the insects flying about at the circumference of the tree. It appears to us that the pectinated nail is well placed and adapted for facilitating perching in the way mentioned, especially as the legs are but weak for the size of the bird. In a stuffed night-jar or podargue, from Tasmania, in my possession, the bird has stronger legs, with the toes directed as in most birds, also large moustaches, yet the claws are not pectinated. Some of our owls are said to have the middle claw pectinated, but the leg of a brown owl which I have by me has a strong cutting edge to the claw. The herons and bitterns have the claw pectinated, as is seen in the drawing (fig. 3) of a Squacco heron, which was shot a few months back in North Staffordshire. In these waders it appears less apparent than in the Night-jar, what is the use of the part,—possibly to secure the foot a little on the slimy stones, or it may be to comb or preen the occipital and gular tufts.

It is well known that the Black-cock and the Capercailie are the only two species of the European Grouse family which ever perch on trees: they have not the claws pectinated, but they are peculiar in having the sides of all the toes fringed or pectinated in a very curious and regular manner, by means of horny processes, much after the same plan as the nail of the Fern-owl (fig. 4). A kind friend, a sportsman, who has procured for me fern-owls, as well as the feet of the Black-cock, a not uncommon bird on our moors, tells me that the latter bird can always be identified by its peculiar footmarks.

The same friend drew my attention to the curious continued note made by the bird, first in a higher pitch, and then in a lower. This note has such an effect that Gilbert White says it produced a vibration through the structure of a summer-house, perceptible to the persons who were sitting within. I cannot decide how this peculiar sound is produced, but I suppose it is by means of the inferior larynx, which, however, is not so much developed as in a singing bird (fig. 5); the trachea, however, has two pairs of very strong muscles, one pair arising from the sternal ribs, and inserted into it below its middle, the other running along it behind, and beginning at the top of the inferior larynx. These may both act on the length of the trachea, and also make tense or re laxthe bronchi and their tympaniform membrane; and thus account for the change of pitch of the note above alluded to. The bird can also emit a faint cry or chirp, and also produce a sharp snapping sound, either by the striking together of the wings, or the closing of the mouth. The upper larynx and mouth are muscular, the latter having many callous points directed backwards. The cornua of the hyoid are like those of the Woodpecker in position. The sternum has an enormous keel, the bird, like the Swift, being wonderfully active on wing. The bones are very light and cellular, so that the rather large skull only weighs four grains. The ear is much developed, as in the Owls; the semilunar or rather circular canals occupy nearly all the posterior walls of the skull, and are surrounded by very cellular bone. The eye is flattened behind, like the Owl, and projected in front, the lens globular in front and flattened behind, and here brought near o the retina, which is very deficient in the absorbing pigment; the iris is very expansible: provision seems made for vision in obscure light, for a pretty extended field of view, and for the distinct sight of near objects. But on these points, as indeed on the use or uses of the pectinated claw, it behoves the writer to speak with some diffidence.

Fig. 5. Larynx of Fern-owl.

It is probable that both the Cuckoo and the Night-jar occasionally remove their eggs from one place to another. For the Cuckoo's doing so, at least in the case of the beautiful cuckoo of South Africa, we have Le Vaillant's authority, and that of other people in England; we have heard the same of the Night-jar, but only from one countryman.

A friend tells us, with respect to swallows, that during the great drought this last summer, the swallows, which usually build in an outhouse of his, not being able to find mud, laid their eggs and reared their young on a cross-beam of the room, without any nest of plastic material at all. R. G.

DECOLOURING AND STAINING VEGETABLE TISSUE FOR MICROSCOPIC EXAMINATION.

By George D. Beatty, M.D.

THE following is a brief statement of the processes I use to discolour and to stain vegetable tissues:—

To effect the discolouring, I use several agents: alcohol, Labarraque's solution of chloride of soda, nitric acid and water, equal parts, adding to each ounce, one drachm of chlorate of potash.

Alcohol will discolour some petals and leaves, and render them beautifully transparent; but when they are stained, the epidermis and stomata are imperfectly visible.

The nitric acid mixture brings out with great distinctness the forms peculiar to the parenchyma; but it has a tendency to injure the epidermis.

The chloride of soda is, by far, the best decolorizer. It bleaches leaves and petals, and renders them transparent in from six to forty-eight hours.

After removing the tissue from this fluid the chlorine must be entirely eliminated. To effect this it must be placed for eighteen, sometimes twenty-four hours, in temperate water. The water should be frequently agitated, and changed several times. It should be in a quart vessel.

If aniline blue be the dye, the next step is to place the tissue in 90 to 95 per cent. alcohol, acidulated with eight drops of nitric acid to the ounce. In this it should remain one hour before being placed in the dye.

I prepare my blue dye by carefully mixing in a mortar an ounce of 95 per cent. alcohol, with one half or one grain of aniline. It is afterwards filtered, and alcohol added to make up one ounce; finally is added one drop of nitric acid. The half-grain solution is the one I now most frequently use.

In dye thus prepared, petals or leaves should remain from two to twelve hours, being occasionally examined, that they do not become too dark. When taken out they should be washed for a few minutes in the 95 per cent. alcohol, then be placed for about four hours in absolute alcohol, then in oil of cloves for one or two hours, preparatory to mounting in gum dammar or Canada balsam. If not convenient to work with this rapidity, the tissue may remain in absolute alcohol for twenty-four, as in that time but little colour will come out. In the cloves it may remain still longer, as in it no colour is lost. The absolute alcohol I use is manufactured by Edward R. Squibb, of New York, U.S.A. A German article I have tried bleaches out the dye, as if it contained chlorine or some alkali.

Aniline blue is the most beautiful and agreeable colour to the eye that can be used.

That which I have most used is a German blue B.B., made at "The Berlin Aniline Manufactory," Mannheim. It is granular in character, of a bright golden-brown hue.

Only two English brands have given me any satisfaction; the first is Nicholson's "Soluble Blue Pure"—in appearance it is similar to the German, only more golden in hue; the second is Nicholson's "Soluble Blue, R.R." It is a cheaper article than the former, and of a much darker shade. I recommend it only when the former cannot be obtained.

"Nicholson's Fast Blue, B.B.B.," and an "Opal Blue" manufactured by the same firm of Brooke, Simpson, & Spiller, London, do not answer at all, as they rapidly fade out on the dyed tissue being placed in alcohol.

In using other anilines the process is the same, except as will be seen below.

I have used, with partial and varying success, the grey, violet, red, and green, about four grains to an ounce of alcohol. The grey should have a few drops of acetic acid added, and the green should be brightened with picric acid. After removing the stained material from the violet, red, and green, it should be kept in alcohol and cloves for only a short time, say half an hour each, as these colours rapidly fade out. Besides the anilines, I have dyed with a carmine solution made half as strong again as Beale's, substituting water for the glycerine; also a concentrated tincture of fresh berries of the Phytolacca decandra. This tincture dyes very rapidly, and not a trace of colour comes out when the tissue is put in alcohol. It mixes with the acid aniline blue, forming purples.

When dyes are acidulated, the alcohol used before them should, also, be acidulated; but when the dyes are not, the alcohol should be pure. A well-chosen, and prepared leaf, mounted with the inferior side towards the cover-glass, on gradual focussing, will show—1st, hairs, if they are present, cells of the inferior epidermis, and stomata; 2nd, cells of the parenchyma and spiral vessels; 3rd, cells of superior epidermis with a few stomata.

Leaves should be small and young, not the youngest.

As much depends upon their selection. I will mention a few that have given me the best results:—*Caculia articulata*, *Pteris hastata*, *Hepatica triloba*, *Oxalis stricta*, or *Oxalis lutea*, *Tropæolum majus*, *Lonicera sempervirens*, *Tradescantia*, *Convolvulus*, *Adiantum;* also the epidermis of the leaf of *Mesembryanthemum crystallinum*, and *Dionæa muscipula*.

It has long been known that alcohol and chlorine will decolour vegetable tissue; but the exact method of decolouring, to prepare for dyeing, described above, together with the dyeing, are original researches.

Baltimore, U.S.A., October, 1874.

[Dr. Beatty has kindly forwarded us specimens of staining as above described, and we are able to speak in the highest terms of their artistic beauty and finish.—Ed. *S. G.*]

ALPINE BOTANIZING.

THERE are few pursuits more calculated to produce that very desirable state of things, a *mens sana in corpore sano*, than botanizing in the Alps or other mountain regions. Both mind and body are fairly exercised, and not too much. It is not a very heavy mental strain to find out the names of new plants, and the body need not go through those wonderful gymnastics requisite for the ascent of high peaks and glaciers and which are not suited to all. The worst pedestrian can botanize in some verdant Alp, smooth as a carpet, and the most intrepid climber can find vent for his energies in climbing the slippery moraine or narrow ledges of the limestone rocks. Scenery need not be neglected; indeed, the eye, wearied by continually gazing at distinct objects, frequently finds relief when the attention is, for a while, concentrated on some tiny floweret. The taste for novelty, so strong in most of us, is gratified, as species are far more numerous in the mountains than in the plains. Alpine plants being generally small and compact, are dried with greater ease and make better specimens for the herbarium than others.

The best time, in ordinary seasons, for a month's botanizing in the Alps, is from the middle of July to the middle of August. More or less snow than usual may make this a fortnight earlier or later. The Alpine pastures are, it is true, in their greatest beauty early in June, but, although, at that time individuals are abundant, species are few, and the snow still covers the higher slopes and summits, where later on the rarer species are to be found.

As this is the hottest period of the year, too much or too heavy clothing is an incumbrance. A light tweed suit, a waterproof in a case, slung across the back, and a light portmanteau with an extra suit, flat, to go under the seat in the railway, will be found sufficient. Unless the botanist has only a few days at his disposal, or wishes generously to provide for a large circle of scientific friends, he will do well to eschew the vasculum. A book made either of wood or leather, and carried on the back, preserves the plants far better, and if the traveller arrives late and tired at his destination, they can be left till the morrow, without any fear of their being spoilt. The flower-press should not be made of solid boards, but of laths joined together, with space left between to allow the humidity to escape. Grooves should be made to hold the straps firmly, and wedges are very useful to increase the pressure. It is better still, if some days are spent in one place, to put heavy stones in the press, which should be exposed as much as possible to the heat of the sun. Plenty of drying-paper should be taken, as English paper is far better than any other. This, as plants should be changed frequently, and several empty sheets should be placed between each series of plants, is the great secret of success. I have found the following plan to answer well and save trouble. Sew three or four sheets of paper together, which we will call mattresses. Place the plants, carefully spread out, between single sheets, leaving them untouched until dry, but placing a mattress above each sheet containing plants. The mattresses should be changed daily and carefully dried before they are again used. Books on botany tell us to press plants lightly at first, gradually increasing the pressure, but I have found them dry best if well pressed from the first. If the botanist provides himself with a well-spiked alpenstock, he will find it answer every purpose for uprooting plants. Spuds, &c., worn round the waist are an incumbrance, and are frequently lost. A fine day should, if possible, be selected for collecting, as plants dry badly if gathered in a wet state. It is not advisable to collect cryptogams at the same time as flowering plants, as they require great and special attention. A large waterproof bag should be taken for mosses, and also a good stock of extra strong paper. Each species should be carefully wrapped up in this, and spread out and dried as soon as possible in the same way as flowering plants, but using less pressure. A portfolio is useful to carry them in, as they are generally too damp for the society of other plants. It is better to prepare them at once, and not to revive them with water later on, as I have found such specimens lose their lustre and also their peculiar habits of growth.

Lichens require no preparation. I have found light wooden cigarette boxes secured with an elastic useful for carrying them. But they take up much room, and do not pack well with other plants.

I trust these few remarks may be of some service. If any one can improve upon my suggestion, I hope he will give me the benefit of his experience in the pages of SCIENCE-GOSSIP.

T. HOWSE, F.L.S.

THE BIG-EARED SUNFISH.

(*Ichthelis appendix.*)

THERE is not a juvenile angler between Canada and Texas that is not fully posted as to the habits and haunts of our several "sunfishes," members of the family *Ichthelidæ;* short and broad highly coloured percoids, numbering in species nearly two score. "Sunnies" they are generally called, but up in Massachusetts they have been dubbed "pumpkin-seeds," as I have been told. In the five great lakes and some of our large rivers, these fish reach a good size, and are considered marketable; but in the little creeks, ponds, and out-of-the-way holes in wet meadows, they seldom grow very large; one five inches long being considered very rare, marking, when caught, a "red letter" day in the captor's experience.

We will now confine our remarks to the species named at the heading of this article,—the well-known "big-ear" or "ruddy rudder," as some call it, from the colour of the tail. Here, let us now clearly state, that the remarks on the habits of this fish apply to it as found in our neighbourhood (Central New Jersey), and may not correctly describe the same fish as found in distant and far different waters. After many years' study of the habits of our fresh-water fishes, we have found that a considerable variation in habits and character of haunts obtains, on comparing notes made, say one hundred miles apart. It is a question, perhaps, whether this variation in the habits of fishes is due to internal, *i. e.* physiological, or to external, *i. e.* physico-geographical causes; whether they are controlled by the physical geography of their surroundings, or of "their own free will" they elect to do differently. If fishes are automata, then their surroundings decide the manner of their doings; but if, as we believe, they *know* what they are about, then they vary in their habits of their own choice; but then, as this choice has certainly been influenced by the nature of the haunts they frequent, physical geography, after all, has had a good deal to do with it.

In a deep pool, on the lower side of a huge outcropping rock, that breaks the swift current of the Delaware river, full many a time have we thrown a line, baited with a struggling grasshopper, and without waiting but for a moment, drawn a gaudy "big-ears" from his favourite haunt. In just such a spot as this, this sunfish loves to be, and in this varies greatly from the commoner species (*Pomotis auritus*), which is emphatically a lover of still waters; the "big-ears" being a frequenter of *comparatively* quiet nooks in rapidly-running water. Of course, we will meet with single specimens occasionally, just where we least expect to find them; but we can safely point this out as a distinction between these two species, the two most abundant and best known of the six species found in New Jersey; the smallest and least known of which is figured in SCIENCE-GOSSIP for Feb., 1871.

are very shy of man; and when, in December, they seek winter quarters in soft mud, beneath deep waters, in sheltered places, they are scarcely an inch in length.

Sunfish are strictly carnivorous, but not so voracious as a pike, and, on the other hand, far more particular in their diet. While worms and insects are greedily caught up by them, thereby making "sunnies" a game fish in a boy's estimation, their principal food are the several species of small cyprinoids (minnows) which swarm in all our streams.

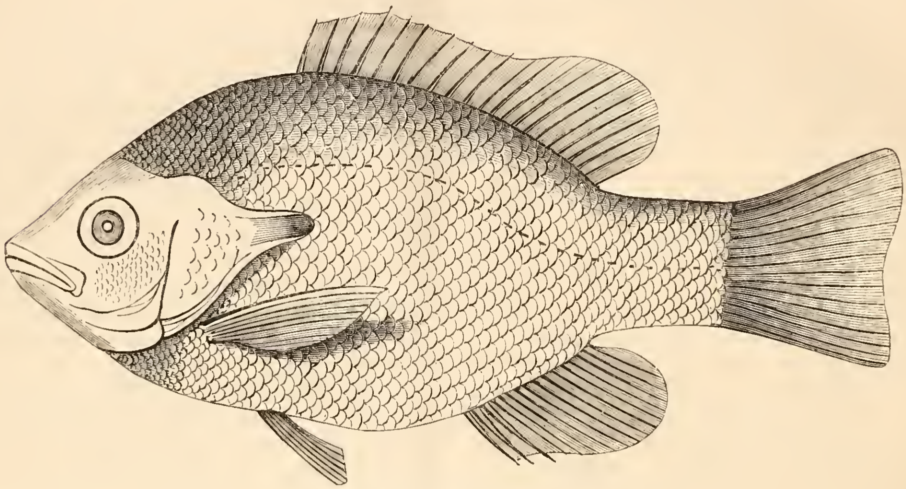


Fig. 6. Big-eared Sunfish (*Ichthelis appendix*).

As with the common *auritus*, this species, in April, becomes brighter in all his colours, and to a marked degree, the tail and abdomen deepen their ruddy hues. They are, we judge, as they fight so fiercely among themselves at this time of year, and only secure a wife after a struggle, a good example of that sexual selection so clearly shown to be ever going on in animal life.

We have never found the "big-ears," in May or June, making a nest near shore, by scooping a shallow basin in the sand, as the common *auritus* does; and indeed, have never found the female when in the act of depositing her ova. Very early in the summer, however, we find myriads of little sunfish in every available nook and corner; and in the gently-running waters, these wee "big-ears" are as much in excess of other sunfish, as they, in quiet waters, hold their own. Granting that the ova of each species take the same time to mature, these little fishes were certainly "ova together" as they are now "children together."

The first summer of their existence they grow but little, but seem to learn a great deal, as they

Like the Pike, the Big-eared Sunfish does not go roaming about in search of food, but, loafing in some convenient spot, keeps on the look-out, and when a luckless minnow comes too near, it opens its capacious jaws, and with a rush, swallows the little cyprinoid, or rather, by a manœuvre, which does not appear to be an automatic movement, makes the little minnow swim down the big percoid's throat. At least, head foremost in it goes, as though it couldn't help it.

From aquaria specimens, and those in private fishponds, which we have studied year after year, we judge that they reach their adult (?) size in four years. That is, that until then, they do not breed; and we question very much if they continue to increase in size after they become breeding fish. So far as we have watched them, they certainly remain about the one thing, after the fourth year, and we have specimens in mind, as we write, that we know to be seven years old; having taken them when newly hatched, and knowing of their breeding by the presence of their young, noted carefully their size from that time until the present. While some

fishes appear to grow as long as they live, and to live for very many years, does this hold good with all fishes? CHAS. C. ABBOTT, M.D.
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THE HISTORY OF CULTIVATED VEGETABLES.

No. VIII.—THE BEAN (*Vicia Faba*).

WE now come to the history of the Leguminous or pea-flowering plants, among which the place of honour must be awarded to the Bean; for, if we are to believe Isidorus, this was the first culinary vegetable man made use of. The monuments of Egypt show that the bean was cultivated in that country at an early date, and the Egyptians, Greeks, and Romans all held very curious and superstitious notions respecting this vegetable. Some authors say because its pod resembles the ark of Noah in form, and in gratitude for the preservation of that patriarch, the bean was forbidden to be eaten. It was formerly consecrated to the dead, and the Egyptian priests held it a crime to look at beans, judging the very sight unclean. The Flamines, or the priests of Jupiter, were forbidden to touch a bean, or even to pronounce its name, for the fatal plant contains a little black spot, which is no other than a noxious character—a type of death. Hippocrates is said to have trembled for his patients when beans were in blossom, from this superstitious fear.

Pythagoras expressly forbade his disciples to eat beans, professing to believe that at the creation man was formed of them. The Romans at one time believed that the souls of such as were departed resided in this plant, and Lucian introduces a philosopher in hell, saying that to eat beans and to eat our father's head were equal crimes. Ovid informs us that this vegetable was used in the funeral banquets of the Parentalia, or sacrifices offered to the manes or the spirit of deceased relations. Clemens Alexandrinus attributes the abstinence from beans to the opinion that they occasioned sterility, which is confirmed by Theophrastus, who extends the effects even to plants. Cicero suggests another reason for this abstinence, viz., that beans are great enemies to tranquillity of mind, for which reason Amphiaraus is said to have abstained from them, even before Pythagoras, that he might enjoy a clearer divination by his dreams. However, in spite of such ridiculous prejudices, this vegetable had numerous and enlightened defenders both amongst Greeks and Romans. It is stated that one of the festivals to Apollo—the Pyanepsia—owed its origin and pomp to the bean. It was then, as Soyer remarks, that this vegetable obtained pre-eminence over all that were boiled in the saucepan. The Romans presented beans as an oblation in their solemn sacrifice called Fabaria, a festival held in honour of Carna, wife of Janus. Pliny informs us that they offered cakes made of bean meal unto certain gods and goddesses in these ancient rites and ceremonies. Lempriere states that bacon was added to the beans in the offerings to Carna, not so much to gratify the palate of the goddess as to represent the simplicity of their ancestors. If this was the case, our dish of beans and bacon is certainly of very ancient origin. Pliny further informs us that when green it was served on tables renowned for delicacies, and when fully ripe it frequently replaced both wheat and other corn.

In ancient times beans were used instead of balls or pebbles in voting by ballot. A white bean signified absolution, and a black one condemnation. From this practice, perhaps, was derived the plan of black-balling obnoxious persons; and from this cause it has been suggested that Pythagoras, in recommending his disciples to abstain from beans, meant to advise them to have nothing to do with politics. The Roman husbandmen had a religious custom connected with this pulse. When they sowed corn of any kind, they took care to bring home some beans, which were offered up to a god to insure good luck; from which circumstance these beans were called Refrinæ. In sales by public auction, too, it was thought lucky to include a bean in the lot for sale. Pliny tells that bean meal is known as "lomentum," and, as is the case with the meal of all leguminous plants, it adds considerably, when mixed with flour, to the weight of the bread. This lomentum was a celebrated cosmetic with the Roman ladies, as it was thought to possess the virtue of smoothing the skin and taking away wrinkles. Columella notices beans in his time as food for peasants only:

> "And herbs they mix with beans for vulgar fare."

Pliny states that in the vicinity of Macedonia and Thessaly the custom was to plough them into the ground as manure just as they began to bloom, and that the land was exceedingly enriched by the process. This author says that the bean is the first leguminous plant that is sown, being done before the setting of the Vergiliæ, in order that it may pass the winter in the ground. He also states that beans grew spontaneously in most places, particularly in certain islands lying within the Northern Ocean; from whence they have derived the name of Fabariæ. They grew wild also throughout Mauritania (now Morocco); but these Pliny characterizes as so hard and tough that they could not be boiled tender. One of the most noble and powerful families of Rome derived the name of Fabii from some of their ancestors having cultivated the bean.

Although many allusions are made in the Scriptures to wheat and barley, we do not read of the bean being cultivated, and it is only twice mentioned. The earliest notice is of those brought with other provisions by the three loyal Israelites to King David when he fled to Mahanaim from his rebellious son Absalom (2 Sam. xvii. 28). The prophet Ezekiel was commanded to make use of this pulse as one of the ingredients of the bread he was to eat for 390 days (Ezekiel iv. 9). According to Rabbinical authority, it is stated that the much-esteemed Egyptian bean was cultivated in Palestine, and the same source of information declares that the eating of this vegetable was interdicted to the high priest on the day of atonement, from its decided tendency to bring on sleep. The Moors, it is believed, when they conquered Spain, introduced the bean into that country, and from there or Portugal the seed, some authors suppose, soon after was imported into the British islands. Gerard states that the garden bean is the same in all respects as the field bean, the one having been improved only by the fertility of the soil. Since that period, like all other vegetables, it has ramified into many varieties. Those cultivated for agriculture are known as *Faba vulgaris arvensis*, or, as Loudon calls them, *Faba vulgaris equina*, because they were grown chiefly for the use of horses. There is a strong and well-marked difference between these and those cultivated for the garden, but both are botanically included under one species. Of the field bean there are at least twelve varieties, and of the garden about twenty. The earliest garden bean is a small-seeded kind, called the Maragan, which was introduced into this country from a place of that name on the coast of Morocco. The large variety, called the "Windsor bean," is said to have been first cultivated in that neighbourhood by some Dutch gardeners who came over at the Revolution.

There is a field near Eton still called the Dutchman's garden. This species of pulse is extremely prolific when planted in a suitable soil; Phillips tells us of a single Heligoland horse-bean, planted in the garden of Beaulieu poor-house in the year 1821, that produced 126 pods, which contained 399 good beans fit for seed; and, had the plant not been blown down by the wind in the midst of its bloom there is reason to suppose it would have produced nearly double that quantity. Beans were used medicinally by the ancients: when bruised and boiled with garlic, they were said to cure coughs that were thought past remedy.

Ever since the Middle Ages the bean has played a very important part in the famous Twelfth-night cake almost all over Europe. In Brand's "Popular Antiquities," we read that the choosing a person as king or queen by a bean found in a piece of a divided cake, was formerly a common Christmas gambol in both the English universities. Thomas Randolph in a curious letter to Dudley Lord Leicester, dated Edinburgh, Jan. 15, 1563, mentions Lady Flemyng being Queen of the Bene on Twelfth day.

Fuller, in his "Worthies," mentions that Leicestershire in his time was famous for beans, and under the proverb Bean Belly Leicestershire he writes, "Those in the neighbouring counties used to say, merrily, 'Shake a Leicestershire yeoman by the collar, and you shall hear the beans rattle in his belly.' But those yeomen smile at what is said to rattle in their bellies, whilst they know good silver ringeth in their pockets." The poet Southey mentions that in days gone by the Mayors of Leicester used to be chosen by a sow. The candidates sit in a semicircle, each with his hat full of beans in his lap, and he was elected Mayor from whose hat the sow eats first! (See "Common-place Book.")

Beans are cultivated over many countries, as far to the eastward as China and Japan; they are very generally used as an esculent in many parts of Africa, particularly in Barbary, where it is usually full-podded at the end of February, and continues in bearing during the whole spring. When stewed with oil and garlic, beans form, according to Shaw, the principal food of persons of all classes in that country. It would appear from Dickson's "Husbandry of the Ancients," that Faba was derived from Haba, a town of Etruria, where the bean was cultivated, and it is the same as the small bean of our fields.

H. G. Glasspoole.

THE ANATOMY OF THE LARVA OF THE CRANE-FLY.

I PURPOSE in the following to give an account of so much of the organization of this creature as I have been able to make out from observations conducted at intervals during the past summer, premising that there are many points on which my information is as yet obscure and defective, a deficiency which I hope will be supplemented by the remarks of others, or perhaps by myself, at a subsequent period.

The Crane-fly, or "Daddy Long-legs," as it is popularly called, is familiar to every child; its larva, however, is probably not so well known, from its life being spent in burrowing under the surface of grass meadows, by reason of which it is less accessible to ordinary observation. Farmers, however, and horticulturists have reason to know and dread the ravages which it commits by biting through the roots of grass and garden vegetables, many an acre of choice meadow land being utterly spoiled by its silent yet destructive operations. It may easily be obtained by digging up small portions of turf with a trowel, and appears as a fat fleshy grub or maggot of a dirty grey colour, varying from an inch to an inch and a half in length, destitute of feet or any means of locomotion, save the complex system of subcutaneous muscles which enable it to writhe its way through the soil. Its body appears to be composed of thirteen segments,* as follows; viz.—The head, which consists of a hard horny shell bearing the antennæ and the mouth-organs. The front portion only is externally visible, the remainder being internal, and it is capable of being withdrawn more or less by invagination within the following segment. The head is followed by twelve segments, all covered with a tough but yielding integument. The first three of these are somewhat distinguished from the others by being rather narrower; they are also marked in mature larvæ with three pairs of whitish spots on the ventral surface, and correspond, I believe, to the thorax of the perfect insect. The two last segments are so blended that it is somewhat difficult to distinguish them; but in other dipterous larvæ I have seen that the anus evidently occupies the last segment but one, and the posterior spiracles the last; and I believe this to be the case in the present instance.

I will commence my description of this creature with some account of the integument, this being the first structure that naturally presents itself to our notice. I have given some attention to this part of my subject with the view of recognizing the three layers of integument called by Mr. Lowne the protoderm, the mesoderm, and the endoderm.† I must frankly state that I have failed in this endeavour; the structure appears to me to differ in many respects from his description. I must therefore beg my readers to accept my statements as the best conclusion I can at present draw from my observations, but subject to revision at any future time, should I find it necessary to do so. It appears to me, then, that there are three distinct layers in the integuments of the larva,—an external cuticular, an intermediate mesh-like, and an internal laminated layer Of these the first and the last occur over the whole surface of the larva, the intermediate only on the lateral portions. On examination with a lens, it wil be seen that there are two broad bands, which I shall call the lateral bands, one on each side of the larva, where the integument differs in appearance from that on the dorsal and ventral surface. On the last-named portions, the skin, although crossed with deep transverse folds, especially at the junction of the segments, is comparatively smooth, while on the lateral bands it is rather darker and of a corrugated or puckered aspect. This difference of external appearance corresponds to a difference of structural arraugement, and I believe of adaptability to the requirements of the insect. The external or cuticular layer, as before mentioned, is common to the whole surface, and appears to be an almost structureless membrame of a light amber-colour, the protoderm I believe of Mr. Lowne. I have sometimes fancied I could detect a cellular structure in it, but am uncertain about this. On the lateral bands its surface is puckered, as seen with a $\frac{1}{4}$ objective, and is covered with minute hairs (mere elevations I believe) scattered irregularly over the surface, and pointing backwards. On the dorsal and ventral surfaces, however, it is much smoother, and the hairs here are arranged in short groups or rows. Besides these hairs, there are occasionally a few of a much larger description, which arise from a cup-shaped basal sheath, and present a fluted appearauce when sufficiently transparent.

On the lateral bands there are frequently deep pits, corresponding to internal elevations, which form points for the attachment of muscles. The intermediate layer is confiued to the lateral bands, and consists of a yellowish and apparently tough dense tissue, with lozenge-shaped interspaces, having a direction transverse to the length of the band, and giving it the appearance of a mesh or net. This layer is closely adherent to the outer one first described; indeed, I have only been able to separate the two accidentally, and over very small portions, yet sufficiently to show their distinctness. I scarcely know how to regard this tissue, but am inclined to think that its structure is somewhat similar to that of cartilage, in which soft transparent cells are separately imbedded in a harder, semi-transparent, intercellular matrix. On one occasion I found, on tearing it away from the subjacent laminated layer, that the surface of the latter was covered with little eminences, corresponding in size and order of arraugement with the clear interspaces above them; and if my view is correct, these would be the cells torn from the interspaces, through being perhaps more firmly adherent to the layer beneath them than to the matrix by which they were surrounded. This subjacent layer is the innermost and the thickest of the three which

* Mr. Lowne says that seventeen "is the typical number of segments assigned on theoretical grounds to all true insects, which always have the body in the perfect state divided into three parts, the head, the thorax, and the abdomen, and that the head consists of five of these segments. This is doubtless correct, but for my present purpose I have preferred, with Burmeister, to regard the head as the first segment. See Lowne's "Anatomy of the Blow-fly," p. 3, and Burmeister's "Manual of Entomology," Shuckard's translation, 1836, p. 35.

† Mr. Lowne's remarks on the subject of the integument will be found at p. 9 of his "Anatomy of the Blow-fly." They are too long to give a fair summary of them here. Though evidently intended to apply primarily to the integument of the fly, I understand their main outlines to be applicable to that of insects in general, as I gather from the opening passage; viz., "the integuments of insects are usually said to consist of three layers, and these may be easily traced in the fly;" and then he goes on to describe them as they are found in that insect. The chief difficulty to which I refer in the text is, that I cannot discern any cellular character in the innermost layer, which appears, as I have stated, to be composed of several laminæ, superimposed closely and generally evenly one over the other. I should state that the instrument I employ is one of Smith & Beck's popular microscopes, furnished with $1\frac{1}{4}$ objectives, with which I have no difficulty in making out most examples of cellular structure.

compose the integument, and is readily separable from the other two, especially if it has been soaked in liquor potassæ, or for two or three days in water: it occurs on all parts of the larva, and apparently consists of several closely adherent sheets, or laminæ of structureless tissue. I cannot discern the least appearance of cellular structure in it. Sometimes I have thought I discerned a fibrillated appearance, but think that this is only due to foldings of the laminæ. On the dorsal and ventral surfaces these laminæ are superimposed evenly one

Fig. 7. Larva slightly enlarged.

Fig. 8, *a*.

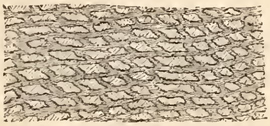


Fig. 8, *b*.

Fig. 8, *c*.

Fig. 8, *d*.

Fig. 8. Integument: *a*, the outer layer, showing one large and a number of small hairs,—the central portions of these figures represent the lateral bands; *b*, the intermediate layer; *c*, the innermost layer; *d*, section showing the corrugations of the innermost layer, ×100.

over another, and the substance of which they are composed having little elasticity, the integument is incapable of being stretched to any material extent. On the lateral bands, however, the laminæ are corrugated, as shown in the drawing annexed, the lines of corrugation taking generally a longitudinal but somewhat sinuous course parallel to the length of the bands; the result of which arrangement, coupled with the inequalities of the cuticular layer, is, that the integument of these portions of the larva, though allowing of but little extensibility in a longitudinal direction, can be stretched very considerably in the opposite or transverse one, the intermediate layer, of course, yielding like the meshes of a net would do in similar circumstances. On the removal of the tension, the integument resumes its original condition. I have frequently noticed the habit the larvæ have when handled of shortening and swelling out their bodies, but had no idea, till close examination revealed it, how elaborate was the provision necessary to secure the performance of so apparently simple an act. I should mention

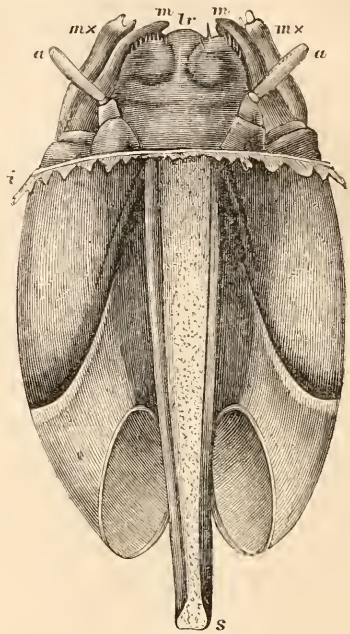


Fig. 9. The Head and Mouth: *aa*, the antennæ; *lr*, the labrum; *mm*, the mandibles; *mx mx*, the maxillæ; *i*, the broken edge of the soft integument of the body, all above which is internal; *s*, the spur, ×50.

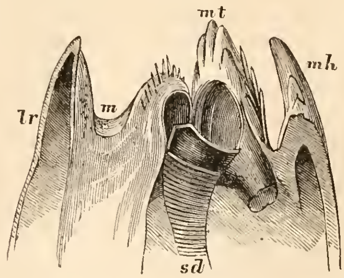


Fig. 10. Longitudinal and vertical section through the front part of the head, showing *lr*, the labrum; *m*, the mouth; *mt*, the serrated mentum; *sd*, the salivary duct: *mh*, the serrated margin of the head beneath the mentum, ×50.

that the cuticular layer seems to be continued over the horny casing of the head and the mouth-organs, and that beneath it is a considerable thickness of horny substance, in which I cannot detect any structure. I believe it to be a continuation of the laminated layer already described, which here passes into the horny substance known as chitine. Before entering upon a description of the digestive organs, I must say a few words on the head. This, as viewed from below, is shaped somewhat like a bishop's mitre inverted, having a deep cleft down the centre of its ventral surface, through which the œsophagus, the salivary duct, and the several nerves pass. On the dorsal surface, opposite the cleft, is a projecting spur, shown in the drawing, formed by two horny rods connected by membrane. The whole of this portion of the head is internal, being enclosed within the soft body of the creature, the skin of which is attached round it in the line indicated in the figure. The remaining and anterior portion is external, and carries the antennæ and the trophi, the eyes being absent, as might be expected from the subterranean habits of the creature.

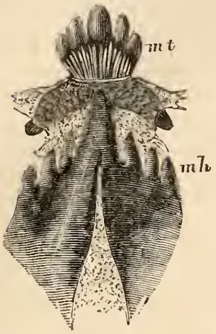


Fig. 11.

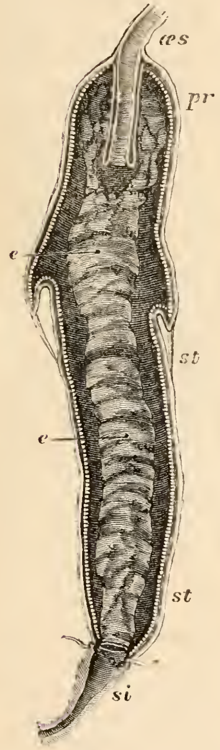


Fig. 13.

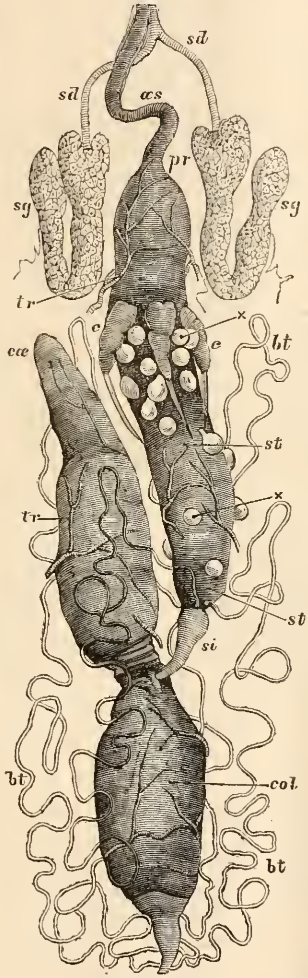


Fig. 12.

Fig. 11. The mentum and lower margin of the head from beneath,—letters as before, × 50.
Fig. 12. The alimentary canal: *sd sd*, the branches of the salivary duct; *sg sg*, the salivary glands; *œs*, the œsophagus; *pr*, the proventriculus; *cc*, the cæca of proventriculus; *st st*, the stomach; *xx*, round white bodies adhering to stomach; *bt bt*, the biliary tubes; *si*, the small intestine; *cæ*, the cæcum; *col*, the colon; *tr tr*, tracheæ, × 10.
Fig. 13. Section through the proventriculus and stomach, showing the muscular and membranous coats, and the epithelial lining, the latter being indicated by the beaded outline: *ee*, cast-off membranous coats of stomach-contents from the epithelium; the remaining letters as before, lying loose inside and separating the stomach, × 10.

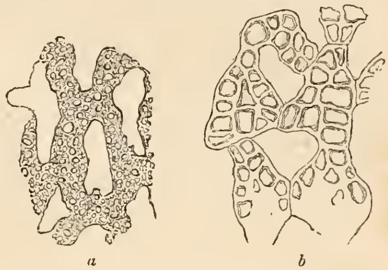


Fig. 14. Fatty rete: *a*, white portion; *b*, yellowish portion near the anus, showing distinct oily particles, × 50.

Fig. 15. *a*, Organisms found in stomach (gregarinæ?), × 100; *b*, organisms in cæcum and colon, × 100.

The cavity of the head is chiefly occupied by the powerful muscles of the mandibles, to the exclusion almost of its legitimate occupant the brain, which lies in the ventral cleft just referred to. The antennæ are single-jointed organs, placed close to the labrum and the roots of the mandibles, and present nothing very remarkable. The trophi, or mouth-organs, consist of the following parts; viz.,—1st, the labrum; 2nd, the labium; 3rd, the mandibles; and 4th, the maxillæ. The first of these, viz. the labrum, is a thick fleshy organ covering the mouth, beset with hairs on its inner surface. The labium is not so easy to recognize; I believe, however, that the horny serrated plate, of which I give a drawing, is the mentum: it is connected by membrane with the anterior and inferior margin of the head, which is somewhat similarly serrated. Immediately above it is a minute fleshy eminence, the rudiment, I think, of the tongue, between which and the plate in question lies the opening of the salivary duct, surrounded by a horny ring. The mandibles are stout, slightly curved, and terminate in two blunt points: at their base is a knob-like process, to which a few hairs are attached. The maxillæ are of an irregular shape; they are situated just beneath the mandibles, and are surmounted by two minute papillæ, which may represent the maxillary palpi.

The salivary glands and duct, as they open into the mouth, are the first portions of the digestive organs that claim our attention. The former are two membranous sacs which lie immediately behind the head, one on each side of the œsophagus. They are bent back in a loop upon themselves, and are lined with a delicate nucleated epithelium. A ringed tube, somewhat like a large trachea, issues from each gland, and these soon join in one, forming the common salivary duct, which opens into the mouth. The digestive canal commences with the œsophagus. This is a slightly-bent membranous tube, which, passing through the head and the œsophageal nervous ring, terminates in a bell-shaped cavity — the proventriculus. This tube has an internal coat of structureless membrane, surrounded by a muscular one of stout circular muscular fibres. Between the two is a layer of what appears to be formative plasma, containing a number of delicate spherical nucleated cells. The inner coat exhibits fine longitudinal striæ, which are, I think, nothing but minute folds. The œsophagus terminates posteriorly in the proventriculus, where it forms what may be called the clapper of the bell, as it projects some distance into its interior, the inner lining membrane being reflexed upon itself, so as to form the walls of the latter organ. The proventriculus terminates by a slightly constricted orifice in the stomach, and also in four short blind bags or cæca, the homologues of those which exist in the maggot of the Blow-fly, though in the latter insect they are much longer. The stomach is a tubular organ, and extends from the proventriculus to the opening of the bile-tubes. The walls of the proventriculus and stomach are similar in character, and, like those of the œsophagus, consist of an internal membranous and an external muscular coat; the former, however, is thinner than in the œsophagus, and the latter consists of an internal layer of circular, and an external one of longitudinal, fibres. Both these are finer than those of the œsophagus, especially the former, where the characteristic striæ seem almost lost, at least with the optical power at my command. Some of the longitudinal fibres pass from the ends of the cæca, and form muscular bands, connecting these organs with the walls of the stomach. A few delicate cells, like those on the œsophagus, may be seen between the membranous and muscular coats. The internal surfaces of the proventriculus and stomach are lined with a layer of cylindrical epithelial cells, casily detached from each other and from the wall of the stomach: perhaps these secrete the gastric juice. On the epithelial lining I have frequently found minute organisms, which I believe to be the parasitic protozoon described by Dr. Carpenter as the Gregarina; but as the specimens in which I found them had all been kept in spirits, I, of course, could not observe whether they had independent life or not. The cavities of the proventriculus and stomach are filled with a dark brown fluid, which exudes in great quantities in freshly-killed insects when the walls are ruptured. They are also occupied by a tangled mass of exuviæ separating the half-digested food-contents from the epithelial lining, and entirely unconnected with any portion of the wall of the stomach. I believe it is what indeed it much resembles, viz., a bundle of cast-off clothes, the remains of successive moults, which probably serve to protect the epithelial lining from abrasion by the rough ends of grass, fibres, &c., which fill the stomach. The external surface of the stomach, especially at its upper portion, is frequently covered with a number of round white bags, varying from two or three to twenty, or more. These are adherent to the outer muscular coat, and have no connection at all with the stomach. They are filled with fluid, in which float a great number of minute corpuscles. I do not know at all what these objects are, but think they are abnormal products, the result, perhaps, of disease, or of some parasite. I am the more inclined to this opinion from the circumstance that I have occasionally, though rarely, found them absent.

The biliary tubes open into the end of the stomach. They are four in number, or, to speak more correctly, two, since they anastomose in pairs, and consist of long tortuous narrow tubes lying between the intestines and the surrounding fatty rete. Their course is first forward, towards the head of the larva, and then backward, towards the anus, where their convolutions are thickest. They are filled with a brown granular fluid, with oval cells. Below the opening of the biliary tubes, the membranous wall becomes thicker, and is set with minute spines; the circular fibres of the muscular coat also become much thicker and stronger, so as to form a sphincter separating this from the succeeding and terminal portion of the intestine, which opens on the anus. This is a large sac, prolonged anteriorly towards the head into an almost equally large blind process, or cæcum, the two together occupying as much space in the body of the larva as all the rest of the digestive cavity together. The membranous and muscular coats which we have traced in the œsophagus and stomach are continued also in this organ; the fibres of the latter are, however, more irregularly and sparsely disposed than heretofore, except near the anus, where the circular ones again become prominent, forming a sphincter round the opening. The wall of the sac often looks crumpled, as if drawn together into pits by the action of the muscular fibres; and between the two coats, at least near the anus, there is a layer of large soft nucleated cells, roughly hexagonal, and reminding one of those between the coats of the œsophagus. With respect to the functions of the several parts of the alimentary canal as above described, I can say but little with certainty; but there are some remarks which I feel tempted to make. Burmeister* states that the chyle in insects is a "whitish, greenish, or even brownish thick liquid, which first presents itself as a flocky substance between the innermost and second tunics of the stomach, and upon a microscopic investigation appears to consist of minute globules." This corresponds very well with the dark brown liquid I have always found in the proventriculus and stomach, and which I therefore regard as the chyle. This fluid is the ultimate produce of the digestive act, and in the higher animals it is absorbed into the general circulation by the lymphatic vessels placed along the small intestine. As insects are not provided with lymphatic vessels or veins, it is evident that absorption must in them take place directly through the walls of some part of the intestinal canal; and Burmeister states that it has been observed to take place through the walls of the stomach.† In this insect, at all events, I think that it must do so, for if not, it must pass either through that portion which intervenes between the opening of the bile-tubes and the large gut, or else through the walls of the latter organ itself. Now the membranous and muscular walls of the former portion seem too thick and impervious to allow of this, and the latter organ is generally quite full of dry excrementitious matter, and in neither part do I find any further trace of the fluid in question. I therefore think that the functions of digestion and absorption, which in the higher animals are performed respectively by the stomach and small intestine, are here carried on in the common cavity of the proventriculus and stomach, perhaps indifferently in either, for I cannot discern any differenee of structure in the two that should lead me to think otherwise.

It may be noticed that I have abstained from naming those portions of the intestine which succeed the opening of the bile-ducts, and I have done so because I am not quite certain how to regard them. The portion that intervenes between the bile-duets and the large gut seems to me to correspond in position, though not in function, to the small intestine in the vertebrate animals, the sphincter representing the valvular aperture known as the ileo-cæcal valve, and the large gut, with its cæcum, answering to the large intestine or colon with its cæcum. But I find that Mr. Lowne, in his "Anatomy of the Blow-fly," speaks of the evidently corresponding portions of the intestine of that insect, as the large intestine and the rectum respectively.* I do not know why this is, and cannot quite reconcile myself to regard the latter huge cavity as the rectum, which term signifies the latter portion only of the colon in vertebrates, viz. that immediately preceding the anus. The functions of the salivary glands and the bile-tubes are generally thought to be the secretion of fluids analogous to those from which they take their name. It does not occur to me that I can say more with advantage on this subjeet at present.

The digestive organs are entirely surrounded by a web or rete of loose tissue, apparently consisting of large flat cells, adhering to each other by their edges. Mr. Lowne, speaking of this tissue, says that a store of elaborated nutriment is laid up in it for the development of the pupa.† This tissue hangs, as it were, attached to the bight of the salivary glands, and the bile-tubes lie close to its inner surface. Its colour is generally white, but near the anus I have frequently found it yellow, in which cases also I have distinctly seen that its colour is due to oily particles within the cell, which, so long as the cell wall is unbroken, remain separate, but when pressed out of the cell, run together. Where the white colour prevails, the oily particles are much smaller, assuming the form of globules, and their colour is lost. The whiteness, I think, results from their minute dispersion in the contents of the cells, in the same way as the whiteness of milk is due to the presenee of the butter globules. On one occasion I found that the globules were remarkably deficient, the rete being rendered to a great extent transparent and invisible from their absence. Portions of it, however, were filled with a brilliantly white substance, which, under the ¼ glass, was seen to consist of a vast number of transparent cells, containing a granular, mulberry-like mass. Opposite the lower end of the stomach, there may be seen, in some larvæ, two spindle-shaped bodies, intimately connected with the inner surface of the rete. They consist of membranous sacs, filled with nucleated cells, which present traces of segmentation. The sac has a fine duct connected with it, which I have not traced. These are the rudiments of the future ovaries. The testicles in male insects are also seen as spherical sacs, containing the immature spermatozoa.

A. HAMMOND.

(*To be continued.*)

* P. 368. † P. 368.

* Lowne's "Anatomy of the Blow-fly," p. 57.
† Ibid., p. 29.

"THE attempt to construct a universal globe, implies that we shall not only have a precise knowledge of the events which have oecurred at any particular point, but we shall be able to say what events, at any one spot, took place at the ssme time with those at any other spot."—*Prof. Huxley's Lectures.*

MICROSCOPY.

Hardening of Balsam.—In works on the microscope where any directions at all are given for hardening objects mounted in balsam, they are so elaborate and troublesome that I think the following simple remarks on the subject may be of some practical use. The process I have used for some time with complete success is as follows:—The object and a moderate quantity of balsam are covered with thin glass in the usual way, and if the object is small, held down with a spring clip to prevent displacement. The slide is then boiled either over a spirit-lamp or, better still, over an ordinary microscopic lamp. Vapour of turpentine is freely given off, which, as the slide cools, contracts, drawing under the superfluous balsam, which should be kept round the glass cover with a needle. When cool, the balsam may be chipped off with a knife, and the slide finished in the usual way. The cover can never be displaced, as is too often the case where the slide is not boiled. A little practice will tell when the boiling has gone far enough, as, if continued too long, the bubbles formed during the process will not disappear, and the slide will be spoiled.—*C. C. Underwood, Royal Institution, Albemarle Street.*

Reproduction of Desmids.—The *American Naturalist* states that Prof. Leidy, at a late meeting of the Academy of Natural Sciences of Philadelphia, made some remarks on the mode of reproduction and growth of the Desmids. In illustration he described a common species of *Docidium* or *Pleurotænium*. This consists of a long cylindroid cell, constricted at the middle, and slightly expanded each side of the constriction. When the plant is about to duplicate itself, the cell wall divides transversely at the constriction. From the open end of each half-cell there protrudes a colourless mass of protoplasm defined by the primordial utricle. The protrusions of the half-cells adhere together, and continue to grow. The bands of endochrome now extend into the protrusions, and subsequently keep pace with their growth. The protrusions continue to grow, until they acquire the length and form of the half-cells from which they started. The exterior of the new half-cells thus produced hardens or becomes a cell wall, like that of the parent half-cells. In this condition two individuals of *Docidium* are frequently observed before separation. During the growth of the new half-cells the circulation of granules in the colourless protoplasm is quite active. In a species of *Docidium* $1\frac{1}{2}$ m.m. long by $\frac{1}{10}$ m.m. broad, the growth of the new half-cells was observed to be at the rate of about $\frac{1}{3}$ m.m. in an hour.

Sphæraphides in Urticaceæ and Leonurus.—In the last number of the *Monthly Microscopical Journal*, Professor Gulliver, after referring to the continental observations, and to those of Mr. Roper in a late number of Science-Gossip, on the crystals in the leaf-blade of the Wall-pellitory, describes two kinds of sphæraphides in all the British Urticaceæ. The largest and smoothest, pervading the leaf-blade, are composed of carbonate of lime, and the smallest and roughest, forming chains in the pith and leaf-nerves, consist of oxalate of lime. Though neither raphides nor other crystals have been heretofore noticed in British Labiateæ, the sphæraphides thickly dotted in the leaf-blade of *Leonurus Cardiaca*, or the Motherwort, are large and remarkable, and are composed of carbonate of lime, while the smaller sphæraphides in the leaf-nerves of this plant consist of oxalate of lime; but the pith of Leonurus is destitute of sphæraphides. Thus these plants afford good examples of two kinds of sphæraphides, differing both in form and chemical composition, occurring together in one and the same species; and these crystals are described as beautiful microscopic objects, easily displayed, and admirably suited for preservation, either dry or in glycerine, on slides for the enrichment of the microscopic cabinet.

An Evening at the Royal Microscopical Society.—At the "scientific" meeting of the Royal Microscopical Society, held at King's College on the evening of the 9th December, an unusually interesting series of exhibits was shown, illustrating the progress of optical und mechancial ingenuity in the development of the instrument, which is rapidly becoming an indispensable article of furniture in homes where intellectual culture is promoted, all over the world. One could not help being struck, after a cursory survey of the instruments, at the variety in the patterns. First, Powell & Leland exhibited two of their superb microscopes. In one of them the lines of *Amphipleura pellucida* were being resolved with a $\frac{1}{4}$-inch objective, a feat never before attempted. In the other, an $\frac{1}{8}$th was being made to show the dots on *P. angulatum*, under the very worst conditions, namely, full aperture of the achromatic condenser, conditions under which none but the most perfectly constructed objectives would show anything but flare and indistinctness. Then there were several splendid examples of Stephenson's binocular. One of them, that belonging to Mr. Stephenson himself, was displaying some exquisitely beautiful crystals of sulphur, deposited (so we understand) from bisulphide of carbon upon a glass slip. Several of the new pattern Ross instruments, designed by Mr. Wenham, were being employed to show various objects. One of them was exhibiting a piece of rock crystal (we think) containing minute cavities, in each of which a molecule was in perpetual motion—a perfectly inexplicable puzzle. In another part of the room a tolerably good result was being obtained with

Wenham's reflex illuminator, upon a scale of Podura (*Lepidocyrtus curvicollis*). The scale appeared on a black field, while its markings were brilliantly illuminated. The effect was enhanced by the small angle of the objective, a French $\frac{1}{8}$th of about 60° aperture. Away from the crowd, as befitted aristocracy, was a large microscope by R. & J. Beck, in solid silver, fitted with every conceivable piece of apparatus, all in silver. This luxurious work of art, intended for an American microscopist, and costing £500, was of course the lion of the hour, and is perhaps the most costly microscope ever made. After mention of this, there is of course no further space to allude in detail to the numerous humble brass microscopes in the room. Fortunately it is the observer who utilizes it, rather than the instrument itself, who can claim the credit of a beautiful display, and to whom our advance in knowledge is due. So here the attention was riveted by many objects of unusual interest, upon each of which a long theme might be discoursed. Conspicuous among these was the exhibition of insect dissections by Mr. Loy. They were perfect marvels. Several showed the complete muscular system in certain large lepidopterous larvæ. Various slides illustrated salivary glands and other wonders of insect anatomy. All the specimens were stained in various colours, mounted in fluid, in large cells, on slides 4 in. by 2 in., or thereabouts, which were finished off in coloured cements with the taste and skill which Mr. Loy's friends admire but cannot imitate. This sentiment prompted several of them to assist in the display of the preparations, and so a whole table was devoted to the subject with great success. Salivary glands of insects having been brought prominently forward among London microscopists by recent discussions at the Quekett Club, there were several specimens of these on view, indicating the active operation of an influence to investigate these organs among our working members. Several beautiful preparations by Mr. Tatem, in the category of insect dissections, were seen. Mr. Guimarens had a very interesting series of preparations by Bourgogne, of Paris, illustrating the vine parasite in all its stages (*Phylloxera vastator*). Near him Mr. Fitch was exhibiting a mounted slide containing a harvest spider (*Phalangium*), upon the back of which, and attacking the eyes, was a red parasitic mite, probably a young *Trombidium*. Dr. Gray had a very curious slide on view. It was a piece of skin from the neck of a domestic fowl from Ceylon, which was completely hidden from sight by a dense mass of fleas. The size of the specimen, only a small fragment of the original, was about $\frac{1}{3}$rd of an inch square, and on it might be counted nearly one hundred fleas. Each of them had buried her lancets (I say *her*, because only one or two males were among the crowd of fleas) deep in the skin. Individuals when separately detached and mounted, bore a striking resemblance to the chigoe of the West Indies, before it enters the skin of its host. Elsewhere, at the same table, was the foot of a West Indian spider, having an extraordinary supply of large tenent hairs, illustrating, on a large scale, what is seen in miniature in the structure of the feet of several of our British tree and wall spiders. A remarkable series of models and specimens, at the left as you entered the room, illustrated in a beautiful manner the structure of the cochlea of the ear in various animals. Mr. H. Lee exhibited with Moginie's portable binocular, the larval form of the crayfish, from the Brighton Aquarium, a creature so unlike its parent that, till lately, it was considered a distinct species, and was known as the "glass-crab." It was a beautiful specimen. Among the vegetable preparations attracting notice, was a charming slide of a fungus on wood, shown by Mr. Reeves, and named by him as a *Stemonitis*. Curious deposits from solutions of silica were shown by Mr. Slack; but I must pause in my enumeration, for in this short account, which I thought might interest some microscopists out of London, I have of necessity passed over many most interesting displays. The list of objects exhibited, which will appear in due course in the *Monthly Microscopical Journal*, must supply this information to any one desirous of it. As regards the meaning of these scientific evenings, I would wish to explain that they are held about twice a year, and on these occasions fellows and a limited number of friends meet to exhibit the greatest novelties in microscopical science, or some object from their cabinets of real scientific interest. They were adopted in consequence of the temporary inability of the Royal Microscopical Society to give one of those large evening parties known as soirées; but they are found to be so interesting that they are not likely to be relinquished, even should the society return to their former practice. The essentials for comfort and success are zeal on the part of the exhibitors, intelligent appreciation of what is truly scientific, and the absence of the squeezing and struggling for room to move about which is the invariable accompaniment of a grand soirée, rendering it all but unendurable. There have been three or four of these meetings held previously, at which most interesting displays were made; but this last one deserves more than a passing notice, as evincing the activity of the parent Microscopical Society, in spite of the gradual elimination by the hand of death, one by one, of the pioneers of microscopical science—those whose names are "familiar as household words" to the readers of microscopical literature, and being a promise of better things to come.—*S. J. M'Intire.*

ZOOLOGY.

Parasite on the Common House-fly.—Professor Leidy recently stated that in examining various common animals of our household, he found a thread-worm infesting the house-fly. The worm is from a line to the tenth of an inch in length, and lives in the proboscis of the fly. It was found in numbers from one to three in about one fly in five. This parasite was first discovered by Mr. H. J. Carter, the well-known naturalist, in the house-fly of India. Mr. Carter described it under the name of *Filaria muscæ*, and suggested that it might be the source of the Guinea-worm (*Filaria medinensis*) in man. Mr. Carter states that he found from two to twenty of the worms in one fly of three. Dr. Diesing has referred the parasite to a new genus with the name of *Habronema muscæ*. The singular position in which the worm lives suggests that there are many unsuspected places we may have to search in to find the parents or offspring of our own parasites.

Mimicry.—At a recent meeting of the Entomological Society of London, Mr. Darwin made a communication respecting the larvæ of *Papilio niveus*, and especially on the colour of the pupæ in connection with that of the surroundings of its place of attachment, according to the observations of Mr. Barber in South Africa, who hinted that there might be photographic influences at work. Mr. Meldola stated that no known substance permanently retained the colour reflected on it by adjacent objects; and in reply to remarks made by Mr. McLachlan on the fact that flower-feeding larvæ often assume, in the same species, the colour of their food, said that this might, perhaps, be caused by the colouring matter of the flower being assimilated in an unaltered condition by the larvæ.

Red Blood-Corpuscles of the Hippopotamus, Walrus, and Eared Seal.—Measurements of these corpuscles were given by Professor Gulliver at a late meeting of the Zoological Society. They are smaller in the Hippopotamus than in man, and larger in the Eared Seal (*Otaria*), and in the Walrus (*Trichecus*), than in the human subject. The largest apyrenæmatous or mammalian corpuscles hitherto known belong to the Elephants, the Great Anteater, and the Aardvak; and now it appears that the Walrus has corpuscles of similar magnitude. No British mammal has the corpuscles so large as those of man.

The late British Association Meeting.—A meeting of the local committee in connection with the recent meeting of the British Association was held at Belfast, on Saturday, the 5th of December. The expense incurred had been about £1,800, leaving a surplus of more than £500, which the executive committee recommended should be divided among various local institutions.

So-called Golden Eagle at Dare.—As I was in the neighbourhood of Dare on the 2nd of November, I wrote to ask Mr. Snow if he would allow me to see his Eagle, which has been so often mentioned in Science-Gossip. Although he was not at home, he very kindly allowed me to see the eagle. It is a magnificent bird, but I am sorry to say undoubtedly a young white-tailed eagle—Sea Eagle of Bewick. If Mr. Smyth, who has a note on this bird in the September number of Science-Gossip, will only examine the bird (he does not appear to have seen it himself), he will find the tarsus bare of feathers. This alone is sufficient to distinguish it from the Golden Eagle, in which bird the tarsus is feathered to the junction of the toes. This, which is very like one of the distinctions between the common and rough-legged Buzzard, is a good distinction, though not the only one between the Golden and White-tailed Eagle at all ages. I am very sorry Mr. Snow's eagle does not turn out to be a golden eagle, as I do not believe there is an authentic instance of the occurrence of the Golden Eagle in any of the four western counties, and had this bird proved to be one, it would have been of great interest.—*Cecil Smith.*

Fishes of the Algerian Sahara.—M Gervais has recently made a communication respecting the above subject, in which he states that the genus of fishes known as *Coptodon*, which has been united with marine species, is known to live in Senegal, Mozambique, as well as in the river Nile. Therefore Dr. Tristram's opinion that the above fish may be regarded as a last living vestige of the fauna which peopled the Saharian sea during the Tertiary epoch, is not correct. M. Gervais thinks that the essentially fluviatile character of *Coptodon Bolti* is opposed to this opinion, and indicates that this is also the case with the *Cyprinodon*, which is likewise ejected by the artesian waters of the Sahara under the same conditions. The *Cyprinodons*, like the *Bolti*, are strangers to the sea, and peculiar to fresh water. This is what is ascertained, whether we observe these fishes in Algeria, Portugal, Spain, Syria, Egypt, or even in America. All the fossil cyprinodonts known have been found buried in lacustrine formations, at whatever epoch of the Tertiary period they may have lived. In M. Gervais' opinion, this universal fact negatives Dr. Tristram's theory that the above fishes are derived from a sea stretching beneath the Algerian Sahara.

BOTANY.

Rare Plants at Castle Eden.—Having read in Science-Gossip various articles about the rare plants, particularly of the *Cypripedium Calceolus*, growing in the above place, the writer with three of his friends paid a visit to the place. Having made

the necessary arrangements, we started on a bright Jnne morning from Manchester. Booking at once for Hartlepool; from thence we proceeded along the coast till we got to the bottom of the Dene, where we found the gamekeeper's cottage. There we went and applied for permission to go into the Dene, stating our object; but were at once met with a peremptory refusal. Bent npon getting into the Dene if we could, without risking our personal liberty, we followed the road leading to Castle Eden, when we met a person who told ns that the hotel-keeper at Castle Eden Hotel had authority to give the reqnired permission. The latter told ns he had no snch anthority, and that Squire Burdon took as mnch care of his wild plants as he did of his game. But, notwithstanding this disappointment, we had a most enjoyable excursion. The sandhills a little to the north of Hartlepool were spangled over with thousands of blossoms of *Geranium sanguineum*, intermixed with the snow-white flowers of *Rosa spinosissima*, presenting an appearanee truly beautiful. We gathered *Astragalus hypoglottis*, *Crepis taraxifolia*, and *Lepidium latifoliam*. Descending from the sandhills, we fonnd *Elymus arenarius*, and a little inland we gathered *Orchis ustulata*. During our excursion we found eight species of the Orchis family, including the pretty little *Listera cordata*, in company with *Rubus chamæmorus*; the meadows and green lanes were beautifully ornamented with *Geranium sylvaticum* and *pratense*; and in one place we observed in abundance *Meum athamanticum*. *Polygonum virginianum* was very common, and we were just in time to see the dead flowers of *Helleborus viridis* and *Gentiana verna*. *Tofieldia palustris*, the pretty *Saxifraga aizoides*, we gathered in abundance; and we might almost say we saw thickets of *Potentilla fruticosa*. Of ferns we saw *Asplenium marinum* and *viride*, besides several others, bnt failed to find *Woodsia Ilvensis*, which is said to grow in Durham. We gathered fonr speeies of *Lycopodium*, and several species of mosses, amongst which was *Bryum Zinii* in very good condition. We left Durham, with a very strong impression that Castle Eden Dene was a *terra incognita* to the rambling botanist.
—*James Percival, Manchester.*

"British Hepaticæ."—We have received the third part of this useful and artistically got-up work, although we are sorry that, in consequence of Dr. Carrington being nnwell, the present part is eight pages short of the usnal amount of letter-press. We are consoled, however, by the announcement that the next part will compensate for this by containing eight pages extra. The colonred plates maintain their excellence, or, if there is any difference, those of the present number are an improvement on its predecessors. The periodical issue of this work, in a cheap and easily available form, is a great boon to botanical students whose wishes are more extensive than their purses.

Provincial Societies.—An excellent paper on the "Flora of Eastbourne, as compared with that of West Kent and West Surrey," has been read before the Eastbonrne Natural History Society, by the president, F. C. S. Roper, Esq., F.L.S. Mr. Roper snggestively treated the geographical relations of the flora, and the probable manner in which it originally spread wnen England was united to the European continent. He contended that many species of plants which became predominant in districts affording the most congenial soil and climate for their perpetuation, snpplemented the geological theory of the flora having migrated from an eastwardly direction. At the Folkestone Natural History Society, a paper has been read by the Rev. J. G. Mills, M.A., on "The Etymology of the Names of some of the Flora of the Warren." We purpose giving an extended abstract of this interesting essay in a future nnmber.

Solanum grandiflorum or dentatum (Potato-tree).—I should have stated in my notice of this species in Science-Gossip of October, that the Brighton plant was reared from a berry sent, in 1827, by Major Rooper to his father, from the Cape, where he was then quartered with his regiment. Mr. Baker, of Kew Gardens, tells me that six different species have been named *grandiflorum* by different writers, but none are Cape; that, as far as he can judge without flowers, it is a Peruvian species, *S. crispum*, Rniz and Pavon, well known in cultivation, fignred Bot. Reg. t. 1516: it is stated in Loudon's Encyclopædia to bear a *white* flower, from Chili (*Flora Peruviana*, Ruiz and Pavon, t. ii. 158), introduced in 1824. The stating it to bear a *white* flower misled me, and is clearly an error; for, on referring to the Peruvian Flora, the colonr is given as pale violet (*dilute violacea*): it is most likely a plant of the Cape as well as Chili. It is singular that we have no flora of the Cape, from whence so many plants have been introdnced. Several years back I met, at the late Sir William Hooker's, the late Dr. Harvey, of Dublin, who was then writing a flora of the Cape; but nnfortunately he died before he reached the genus *Solanum*. In Science-Gossip of December, "J. S. T." confirms Mr. Baker's opinion that the plant is *Solanum crispum*; he speaks of it as being well known to him. I find it entirely agrees with the description given by Dunal in the Prodromus of De Candolle, and I am qnite satisfied that Mr. Baker and 'J. S. T." are right. The plant is intensely bitter, as "J. S. T." says; I believe most of the Solanums are so, like the common Bittersweet (*Solanum Dulcamara*). The Brighton plant has the dark violet colour of *Solanum Dulcamara*, and the dark-blue potato. "J. S. T." gives it as pale lavender, and

Ruiz and Pavon as pale violet, but I consider the difference of shade as of no moment. I am informed that in two instances in this county the plant is known to have a strong, hard, woody stem, thicker than a man's arm, growing in open ground without support. The *young branches* are certainly very flexuous and slender, as "J. S. T." says, requiring support when growing against a wall, where they are no doubt drawn up quicker, and are consequently weaker. A number of the plants are being reared from cuttings in Brighton, where in a few years it is sure to become a great favourite.—*T. B. W., Brighton.*

GEOLOGY.

Diamonds in South Africa.—In the February number of Science-Gossip I find a notice of mode of occurrence of the diamonds in South Africa, by Mr. E. J. Dunn, in which the report seems to me to give the author too much of a theorizing process. As regards the theory of the "pipe" being, in fact, a "connection" between molten matters below and surface volcanoes, much, I am inclined to feel, remains to be proved. Such a short report cannot do justice to any subject, and therefore I feel much diffidence in attempting to controvert what has been said by Mr. Dunn. In the first place, supposing Mr. Dunn correct in describing the pipes to be channels of communication to subterranean fire, how have they become filled by their present "medley" of contents? The molten matter must have subsided, and it is not upon the present surface. These "pipes" are filled by a magnesian rock in fragments, mixed with soft crystals, whole and broken, but unworn; clay rocks with their angular fractures unworn, from blocks of many tons dimensions, in one instance told to me costing £70 in its removal, down to minute pieces requiring the microscope to define them. Beside these there is a scattering of water-worn garnets, agates, &c., the same as come out of the river-diggings. The whole of this "medley" is deposited in an orderly manner, at least for some depth, and as far as I had personal knowledge of the mines. From the specimens collected in sorting, I am quite certain that there is an admixture of the river deposits with the contents of the "pipes," the connection between the sites being made by one and the same process. By a letter published in this country, Mr. Dunn has the credit of putting forth the theory of the diamonds being wind-drifted into their present locality. I am afraid this is like the "Angel's tears," likewise said to have been put forth hereabouts by some one as accounting for the diamonds. From all I have observed, I have come to the conclusion that the contents of the "pipes" are water or ice borne, quietly deposited, at least in the upper portion of the "pipes." The surface of the pipe is weather-worn, and not altered by fire. A paper by me was read at the Geologists' Association, in which you will find more detail. Since that paper was read, I have received a note telling me of increased evidence of glacial action. Now there is a difficulty I have always felt in this case,—how was motion of the material effected if the form of the channel was a "pipe"? When I first thought of the ice process, it was that of floating ice, melting and dropping its earthy loads into these cavities in common with the general surface. If there be really any underground channel of communication, where does it come out, or with what does it communicate? As yet I have seen no account to meet the facts, &c., that I have put forth. The theory will have to take its chance, should counter facts come out. Some of the agates of the river-diggings are curious as giving evidence of the motion of bubbles of gas moving within or through them while they were soft.—*G. C. Cooper, South Africa.*

The late Mr. George Scott, F.S.A., Scot.—It is with great regret we announce the decease of a most intelligent and valued contributor, Mr. George Scott, the curator of the Brighton Museum. Mr. Scott has passed away in the very prime of life, and has left behind many sincere, mourning friends. He was an ardent geologist and archæologist, as the manner with which he has arranged the Brighton collections testifies. During the meeting of the British Association, Mr. Scott acted as Local Secretary to Section C, Geology. Last year he was President of the Brighton Natural History Society. Few men had so much genuine knowledge and such an unpretending character. He has died amid heartfelt appreciation of his value, and regret at his loss.

Carboniferous Fruits.—Dr. Dana, in the new edition of his "Manual of Geology," states that the well-known genus of fossil fruits in the coal-measures, called *Cardiocarpus*, was probably related to the modern conifers of the *Welwitschia* type. This is shown by the similarity of the fruit, and also by the close relation of the leaves, that is to say if those called *Cardaites* belong, as is generally supposed, to *Cardiocarpus*. The *Welwitschia* is an embryonic form of conifer, producing no leaves except the cotyledonous; but while probably unlike *Cardaites* in its embryonic features, it shows what leaves and fruit are consistent with the type of conifers.

On the Succession of the Ancient Rocks in the Vicinity of St. David's.—A paper on the above subject has just been read before the Geological Society of London, with special reference to the rocks of the Arenig and Llandeilo group and their fossil contents," by Henry Hicks, F.G.S. In the first part of this paper the author described the general succession of the rocks in the neighbourhood of St. David's, from the base of the Cambrian to the top of the Tremadoc group, and showed that they there form an unbroken series. The only break or unconformity recognized is at the base of the Cambrian series, where rocks of that age rest on the edges of beds belonging to a pre-Cambrian ridge. In the second part the author gave a minute description of the rocks, comparing the Arenig and Llandeilo groups, as seen in Pembrokeshire, with each other, and also with those known in other Welsh areas. Each group he divided into three subgroups, chiefly by the fossil zones found in them. 1. The *Lower Arenig* was stated to consist of a series of black slates about 1,000 feet thick, and to be characterized chiefly by a great abundance of dendroid graptolites. 2. *Midde Arenig*. A series of flags and slates, about 1,500 feet thick and with the following fossils:—*Ogygia scutatrix*, *O. peltata*, *Ampyx Salteri*, &c. 3. *Upper Arenig*.—A series of slates, about 1,500 feet in thickness, only recently worked out, and found to contain a large number of new and very interesting fossils belonging to the following genera; viz. *Illænus*, *Illænopsis*, *Placoparia*, *Barrandia*, &c. 4. *Lower Llandeilo*. A series of slates and interbedded ash, equivalent to the lowest beds in the Llandeilo and Builth districts, and containing species of *Æglina*, *Ogygia*, *Trinucleus*, and the well-known graptolites *Didymograpsus Murchisoni* and *Diplograptus foliaceus*, &c. 5. *Middle Llandeilo*. Calcareous slates and flags with the fossils *Asaphus tyrannus*, *Trinucleus Lloydii*, *Calymene cambrensis*, &c. 6. *Upper Llandeilo*. Black slates and flags, with the fossils *Ogygia Buchii*, *Trinucleus fimbriatus*, &c. The Arenig series was first recognized in North Wales by Prof. Sedgwick about the year 1843, and was then discussed by him in papers presented to the Society. The Llandeilo series was discovered by Sir R. Murchison previously in the Llandeilo district, but its position in the succession was not made out until about 1814. The Geological Survey have invariably included the Arenig in the Llandeilo group; but it was now shown that this occurred entirely from a mistaken idea as to the relative position of the two series, which were proved to be entirely distinct groups, the equivalents of both groups being present in Caruarvonshire, Shropshire, and Pembrokeshire, but the Llandeilo group only of the two being developed in Carmarthenshire. The lines of division in the series were said to be strongest at the top of the Menevian group and at the top of the Tremadoc group, these lines being palæontological breaks only, and not the result of unconformities in the strata.

NOTES AND QUERIES.

TREES SPRINGING OUT OF ENCLOSED TOMBS.—Seeing some instances of the above in SCIENCE-GOSSIP, I thought it might interest some of your readers to know of an instance I have come across. In Finchley Churchyard there are two trees (or rather bushes), and to the best of my recollection they are elders, which grow out of enclosed tombs; the tombs are the kind built of brick with a stone slab on top, and are enclosed by iron railings. One of the bushes has twined round an iron rail and the iron was, when I saw it, embedded for about six or seven inches of its length in the stem of the bush. The stems of both appear to spring from mere crevices between the bricks, and the bricks have been but very slightly displaced. The seeds, I suppose, were carried into the crevices and there took root. The largest of the bushes was about eight or ten feet high and overshadowed the whole tomb.—*E. T. Evans.*

BUTOMUS UMBELLATUS.—Under this heading in SCIENCE-GOSSIP, p. 262, for November, Mr. D. Roebuck records its being found very late in flower at Kirkstall, and I presume, from what he says, that it is rather scarce. My object is to point out a station which has probably been overlooked. Sixteen years ago I lived in Leeds, and one summer, I think within the time he names, I found *Butomus* on the right or south bank of the Leeds and Liverpool canal, about 30 yards above the last lock before coming to Armley: it was growing in company with *Sagittaria*. The latter was abundant; but I cannot say so much of the former. When the season comes round, I would recommend Mr. R. to look out for it, as I think the station was not likely to be improved away or built upon.—*J. Maughan, Barnard Castle.*

PRESERVING MARINE ALGÆ.—Amongst the many classes of material for micro objects that I collect for microscopists, I am often asked for a collection of marine algæ for mounting, but find a very great difficulty in preserving them properly for microscopical purposes, as, if once dried, they become unfit. Many kinds, such as *Cladophora*, in variety, and *Ceramium*, &c. &c., do well in glycerine, but others, of softer texture, and especially fruited specimens, lose their colour or burst. I should feel glad to know how I could overcome this difficulty. I should also be much obliged by a few hints on the best way of collecting foraminifera living in rock pools. From the quantity found on many of the beaches here, I have no doubt they are very abundant in the Bays (Connemara).—*T. McGann, Burrin, Ireland.*

STAINING VEGETABLE TISSUES.—An article on this subject in the last GOSSIP reminded me of an unsuccessful attempt to stain a different substance —native coral.—I am not geologist enough, nor sufficiently scientific, to be able to state the component parts of this article,—probably lime;—but whatever it may be, after trying several dyes, even Judson's, I could not fix any colour permanently. Perhaps some of your readers may be able to give a receipt. —*W. H. B.*

TOAD AND SPIDER.—An acquaintance of mine gave me the following anecdote:—One day, as he was standing in a farmyard, he observed a toad attempting to enter the barn by crawling beneath the door, and when in the act, a spider descended the door and alighted on the toad's back, which it apparently bit. The spider then ascended the door, and the toad retraced its steps to a plant, the "waytre" (*Plantago major*), which was growing a few feet distant from the barn, and partook a little of its leaf. The toad then made another attempt as before to get into the barn, and was again pounced upon by its vigilant foe. The toad, with all speed it could muster, hastened back to the plant, and had a few more bites of the leaf; it then made a third attempt to enter the barn, selecting each time the same place. The watchful spider was, however, at its post, and made another successful charge. The poor toad backed from under the door, and again repaired to where the plant grew; but my friend had in the meantime removed it, much to the apparent disappointment of the sufferer. The toad, when it could not find the plant, immediately sank upon its belly, its body began to swell, and within an hour it died. I may add that my friend, who himself is since dead, was a very conscientious person, and would not, I believe, state knowingly anything that he thought was not true. His impression was that the toad was aware that there was virtue in the "waytre" as an antidote to the bite of the spider. I should much like to know whether anything like the above case ever came under your own, or that of any of your numerous readers', observation, or whether it is probable that such a circumstance is in accordance with nature.—*James Pearson.*

Ancient Trees.—Allow me to add to your list the following account:—"Walnut-trees sometimes attain prodigious size and great age. An Italian architect mentions having seen at St. Nicholas, in Lorraine, a single plank of the wood of the walnut 25 feet wide, upon which the Emperor Frederick III. had given a sumptuous banquet. In the Baidar Valley, near Balaclava, in the Crimea, stands a walnut-tree at least 1,000 years old. It yields annually from 80,000 to 100,000 nuts, and belongs to five Tartar families, who share its produce equally."—*T. B. Linley.*

The Name "Tray" as applied to Dogs.—This word may possibly be a corruption of the German adjective "*Treu*" (pronounced something like *troy*), meaning "true" or "faithful." This seems, at least, a more direct interpretation than that of dogs watching the dinner-tray.—*Frank J. Allen.*

The Cecil Oak.—In what is called "the flat" of Petworth Park stands a fine and still flourishing tree, on which is a plate which tells of its planting in the beginning of the seventeenth century, to commemorate the marriage of Algernon, tenth Earl of Northumberland, and his first wife, Lady Anne Cecil. Can any reader kindly inform me of any existing oak elsewhere, thus planted so long ago in commemoration of a marriage?—*F. H. Arnold, LL.B., Fishbourne.*

Oxyhydrogen Lanterns.—About ten years ago I saw an apparatus which seemed to possess several advantages. The oxygen-bag was in the form of a double cube, fitted into a deal box of the same shape, which, placed on end, served as a stand for the lantern; and the pressure was produced by a water-bag, which could be filled at the place of lecture. It was thus unnecessary to lug about a heavy iron weight, and the oxygen-bag was thoroughly protected from accidents in transit. The double lantern was remarkably compact, and the two gases were made to issue from a brass burner, through separate holes, inclined at different angles, according to the density of the gases, so as to ensure perfect combustion. The dissolvers were not of the usual comb and rack-work pattern, but in the shape of discs in several pieces, so contrived that the one dissolver opened from the centre, while the other closed from the circumference; and all acted on by one lever, so that the change could be instantaneous or gradual at pleasure. The maker's name was Warner. Are such made now? And where are they to be had?—*E. P. C.*

Do Fishes utter Sounds?—Dace, when taken out of the water, frequently utter a sort of grunt or squeak. I suppose this must be caused by the passage of air through some aperture which usually contains water. I have heard that the name "gurnard" is derived from a supposed resemblance of this name to the strange sound the fish makes when first caught. The "piper" might be so named for a similar reason.—*C. W. C.*

"Mype."—I always read with very great interest the articles in Science-Gossip on "Our Cultivated Vegetables;" and Mr. Glasspoole may perhaps like to know that "mype" is at the present day the Welsh name, in *North* Wales, for "turnip."—*Helen E. Watney.*

Cats' Imitation.—A relation of mine possesses a very small tabby cat which habitually begs at meals, though it has never been taught. The cat has of course imitated a Skye terrier dog, which constantly begs for scraps at the table.—*C. W. C.*

Name of "Tray."—May it not be a corruption of "trail," most dogs possessing keen powers of scent? "Tray" in the Saxon signifies "trag" or trough feeding-dish.—*Helen E. Watney.*

Swarms of Ants.—In Westwood's "Introduction to the Modern Classification of Insects," your correspondent's question is concisely answered, vol. ii. p. 223:—"Throughout the greater portion of the year the community consists only of neuters, but during the summer the males and females are produced in considerable numbers; these are detained prisoners in the nest for a certain time, until a favourable day—or, more commonly, a warm, still afternoon—when they make their escape, and take flight in great swarms, flying into the air, where the union of the sexes takes place; soon after this the males perish, but the females, descending to the earth, immediately tear off their own wings, and commence the establishment of a new colony, or are seized and forcibly detained by the neuters for the maintenance of the old habitation. They then commence laying their eggs."—*S. J. M'Intire.*

Imitations of Animals.—In reference to the imitative tendencies of animals, the following facts may prove of interest to your readers. Last summer my brother caught a young wood-pigeon, which has since been kept in the same room with a small white cockatoo. This bird the pigeon imitated in various ways, the most curious being, copying the habit cockatoos have of kissing, and attempting to eat its food by holding it in one claw while it stood on the other leg. This last feat it could not accomplish, but did not give up till after a week's unsuccessful trials.—*J. G. P. Vereker.*

The Name "Tray" as applied to Dogs.—Mr. J. R. S. Clifford's ingenious suggestions on the above subject scarcely seem to afford a satisfactory answer to his question, "What canine peculiarity or habit originated its use?" It is of course quite possible that the more honest dogs of those days may occasionally have been set to guard trays of meat or cheese, as well as homes and sheep; but can any one believe that the good old name has in it no more meaning? I have no doubt whatever that it is directly derived from the German *Treu*, which is not only very similar in native pronunciation, but is still of common application in German-speaking lands, expressive as it is of the noblest characteristic of "the friend of man." Literally then it is "Old dog *Tray* ever faithful."—*R. T. L.*

A Feline Oddity.—Under this heading "W.R.L." states having seen a cat with "eyes of different colours," and asks whether the peculiarity referred to often occurs. Several instances of a precisely similar nature have come under my own observation, and I have heard of many others. Last year a stray cat found its way into our house, and its eyes were of exactly the same colour that "W. R. L." mentions, the right eye being yellowish grey, and the left a bright blue. A gentleman to whom I mentioned the fact said that he had seen one with the same peculiarity some years before. And a lady of my acquaintance tells me that she once had a Persian cat, one of its eyes being light blue, almost approaching to grey, while the other was a very dark brown. This "oddity" is not confined to the feline race, but is sometimes seen in our canine friends. A lady's pet spaniel may daily be seen in our neighbourhood with eyes of different colours.—*G. O. Howell.*

Sea-Anemones.—Some years ago, when residing at Tenby, I kept a small aquarium, but I never experienced the difficulty which your correspondent "Querist" mentions in getting anemones to thrive well. Of course it requires great care to remove them from the rocks. It is a good plan, if possible, to break off the piece of rock to which they are attached. This can generally be accomplished by a sharp blow of the chisel and hammer, but where this fails, an endeavour should be made to insinuate the finger-nail carefully under the base, and thus remove it uninjured.—*G. O. Howell.*

Feline Oddity.—In answer to the inquiry raised in the last number of this journal by "W. R. L." respecting a feline oddity, I would state that I had for some time in my possession a perfectly white female cat having one of its eyes a bright pink and the other a very dark blue. This cat was quite deaf, a characteristic which I have noticed often marks white cats with pink eyes. She took up her residence in my house when about a year old, and deserted it after two years, during which period she seemed to bear a total disregard for everything and everybody. Owing to the unsettled kind of life she seemed to prefer, I have no knowledge of her antecedents; but I am in hopes that, the question now having been raised, some light will be thrown upon the origin of such a beautiful freak of nature.—*A. J. C.*

Feline Oddity.—I have seen a similar case to that mentioned by "W. R. L.," and I fancy it is of regular, though rare, occurrence. The cat to which I allude was, like his, pure white, her right eye green or yellowish grey, her left a pale bright blue. I also have seen a white kitten whose eyes are bright blue. The kitten was blind, or nearly so, with both eyes, and the cat blind with the left, and what is more, blind from birth. I should be pleased if "W. R. L." would ascertain if this is the case with the kitten referred to by him.—*T. W. G., Alresford.*

Feline Oddity.—I see in your August number a notice of a cat with two differently coloured eyes. This is a phenomenon that I have observed and heard of more than once. Have your readers ever noticed a human being exhibiting the same peculiarity? I knew a boy with two such eyes, one a lovely violet and the other a rich chestnut. His vision was perfect.—*J. W. Horsley.*

A Canine Oddity.—In last month's number of Science-Gossip, "W. R. L." gives an account of a cat with differently coloured eyes, and wishes to know if any one else has noticed the same thing. In reply I can state that about ten or twelve years ago I saw a dog with one of its eyes brown and the other blue, but have never seen a cat with that peculiarity. I have heard that it is not a very rare occurrence with dogs, but I have only met with it once.—*R. N. V.*

Gooseberry Caterpillar.—This grub is the larva of the magpie-moth, and the only plan I found effectual in preventing a recurrence of the plague—for my garden was at one time infested with them—was to remove the top soil from under the trees twice a year, in March and September. I used to burn it in another part of the grounds, and put a layer of quicklime down under the bushes, together with a little fresh earth. The eggs of this moth hatch in September, and the larvæ take shelter during winter among the dead leaves, or just under the soil beneath the trees; so my routing effectually put them to flight. The quicklime was allowed to remain for a week or so on the surface before it was forked in.—*Helen E. Watney, Berry Grove, Liss.*

Green Caterpillars.—If "F.K." will only place some soot about a foot round each tree, and a quarter of an inch deep, when they are in full leaf. Be careful not to let any of the boughs touch the ground; for if you do, it will be of no use, for it will give them the means of getting up again into the tree. I should also give the bushes a little shake one evening during the week. By following these directions, he will find they will all disperse.—*W. H. G., Somerton, Taunton.*

A Carnivorous Hedgehog. — A man, near Groton, Suffolk, was rearing some young fowls, and night after night he found them killed; only their breasts eaten, and there left. It puzzled me considerably; I knew it was neither a rat's nor weasel's work. I hunted all the hedges round, with a terrier; still no sign of the depredator. Two or three nights after I set a trap (a common iron one, baited with a chicken) in the hen-coop, and in the morning I found I had caught a very large male hedgehog. I have not been able to hear of any parallel cases amongst poultry-keepers in this neighbourhood, although I see there have been cases mentioned in the *Field* newspaper. Have any of your readers met with similar instances?—*F. C. S.*

The Umbilicus in Univalve Shells. — I should be much obliged if any of your correspondents could tell me what purpose is served by the umbilicus present in certain univalve shells. I imagine that in the simpler kind of shells it may possibly take the place of the columella, and that all shells, as a rule, would, in their embryonial state, be found to have an umbilicus, which in those of more complex structure disappears when the columella is formed, but is generally retained permanently by shells of simpler structure as a kind of rudimentary columella. As the above, however, is only my own idea of the matter, I should be glad to know what is believed to be the real purpose of the above-named structure. I think I am right in the supposition that, as a rule, only the simpler shells—those in which the columella is imperfectly developed—retain the umbilicus permanently.—*C. Jecks.*

NOTICES TO CORRESPONDENTS.

J. W. (Dukinfield).—No. 1 is *Erysimum cheiranthoides*, L.; No. 87 in the Seventh Edition of London Catalogue of British Plants. No. 2, *Cotula coronopifolia*, L.; not a native of the British islands. It was probably introduced with agricultural seeds. We have found many species on manure-heaps and around the border of fields introduced in this way.—R.

J. K. (Pillgweally, Newport).—You are quite correct, it is *Linaria repens*, but the second specimen was crushed to small atoms, so that we can scarcely tell it is a Centaurea. Could you not in future dry the specimens sent to us for identification; if partially dried, they come to hand in excellent condition. We have tried hard to make out the species, but cannot state, with any degree of certainty, in its present mutilated state.—R.

W. D. E.—The object which caused your midnight alarm was the Great Water-beetle (*Dytiscus marginalis*). No stamps were inclosed in your letter.

Lignite.—We have received several specimens through the kindness of several correspondents. If J. Sims will send us his *full* address, we shall be glad to forward them.

C. calcitrapa.—Dr. Morton has asked us to state that pressure on our space delayed the insertion of his communication until the Yellow Centaurea had done flowering; he hopes to find it again in the coming summer, and to forward specimens to each applicant.

H. J. McG.—It is impossible to extend the Correspondents' column, as it would not be fair to exclude information intended for the thousands of our readers in order to relieve the difficulties of one. We are forced, therefore, to fall back on the *courtesy* of our correspondents.

W. H.—Your plants are:—1. *Quercus ilex*; 2. *Podocarpus*, Sp.; 3. *Melaleuca*, Sp.; 4. *Colletia cruciata*.

W. Macmillan.—Your wasp was undoubtedly a variety of *Vespa vulgaris*. This genus is a very variable one. In your too brief description of your specimen you should have mentioned the sex, and whether the basal joint of the antennæ was black or yellow.—J. B. B.

J. L. G.—The bird you call "Fire-tail" was the Redstart (*Ruticilla phœnicarus*, Lin.).

E. M.—*Rhytisma acerinum*, a fungus; nothing of interest as a microscopical object.

C. C. U.—*Uredo filicum*, not uncommon on ferns.—M. M. C.

G. Parsons.—1. *Aulacomnium androgynum*. The others are correct.

T. B.—1. *Polytrichum commune*; 2. *Dicranum scoparium*; 3. *Atrichum undulatum*; 4. *Dicranella heteromalla*; 5. *Tortula unguiculata*; 6. *Orthotrichum anomalum*.—R. B.

Minnie D. Read.—Your shells are: 1. *Littorina littorea* (yellow variety); 2. *Columbella mercatoria*; 3. *Nerita undata*; 4. *Cerithium*; 5. *Nerita*; 6. *Mitra*.

Nolens.—"Grevillea," the journal of Micro-botany, edited by M. C. Cooke, is now published *quarterly*, instead of monthly, as formerly.

T. Wilson (Aberdeen).—Coloured sheets, each showing the British poisonous and edible fungi, are published by Hardwicke, 192, Piccadilly, London.

C. H. Griffith.—We believe the "Lepidoptera of New South Wales," was published in Sydney. The work, which is by Mr. Cox, was published in parts at one guinea each.

J. Greenfield.—Get Cooke's "Structural Botany," of which a new and enlarged edition is just published by Hardwicke, 192, Piccadilly.

T. O. Newton (Birmingham).—We could not identify No. 1 specimen, it was so crushed. No. 2 is selenite; 3, green fluor spar; 4, sulphite of zinc, commonly called by the miners "Black Jack," to distinguish it from "Blue John," the dark kinds of fluor spar.

John Webb.—The Cambridge fossils most likely come from the so-called "Coprolite Bed," at the bottom of the chalk; the Leicester fossils are probably Liassic; those from Leighton Buzzard may be Gault. For these, refer to the "Chart of British Fossils," by Lowry, published by the Christian Knowledge Society. London Tertiary fossils are illustrated by another special chart by the same author. The peat at the East London Railway is probably the old "forest-bed" of the Thames, but a lignite-bed in the "Woolwich Series" might also be found there. See Mr. Walker's Saturday "Half-holiday Rambles," for an account of the forest-bed.—W. W.

EXCHANGES.

Shells from Devon coast offered for Continental, Marine, Land, and Fresh-water Species. Lists exchanged.—Martin, 97, Union-street, Torquay, S. Devon.

Correspondence and Exchanges wanted in Terrestrial and Marine Conchology with American, Continental, and Colonial Conchologists, by Frederick Robertson Martin, 97, Union-street, Torquay, S. Devon.

Duplicates: *Ligustri, Citrago, Nupta, Maura, Bucephala, Progemmaria* (males), *Atalanta*, &c. Desiderata: Ova and Pupæ.—W. Harper, Norfolk Park, Maidenhead.

Physcomitrium sphæricum, B. and S., for other rare Moss.—W. H. Pearson, Seedley Cottage, Pendleton.

For well-mounted slide of Silver Ore, Utah, rare, send other good interesting Slide. Others to exchange.—W. Tylar, 165, Well-street, Birmingham.

Wanted, all kinds of Micro Material; good mounted Slides in exchange.—A. Quayle, 182, Regent-road, Liverpool.

For Cuticle of Yucca, send stamped directed envelope to W. H. Gomm, 2, Oak Villas, Mattock-lane, Ealing.

Well-mounted Objects exchanged for Parasites and their Eggs. Send list to John Boyd, Victoria Park, Manchester.

For *Rotalina foram.*, from Atlantic Soundings, mounted, send good Slide to H. C., 24, Rodney-street, Liverpool.

For specimen of Alvin (for the Polariscope), send stamped directed envelope to J. Coles, 248, King's-road, Chelsea.

Mounted Diatoms for other mounted Objects, or good unmounted.—R. M., Post Office, St. Andrews, Fife.

Wanted, Foreign Algæ, especially the *Corallinaceæ*, for Flowering Plants, Ferns, or other Cryptogams, by A. Croall, Smith Institute, Stirling, Scotland.

Hair of New Zealand Tree-fern, Stellate Hairs from Seedpod of Arbutilon, and many others.—Send list to C. C. Underwood, 25, Gloucester-place, Portman-square, W.

Wanted, Vols. 1, 2, 3, 6, and 7 of Science-Gossip, for Vols. 3, 4, 5, 11, 12, 13, and 14 *Cornhill Magazine*, unbound.—J. Webb, 17, Sandbrook-road, Stoke Newington.

A few pairs of *Murex tribulus* (Thorny Woodcock), for Fossils, Shells, or other objects of interest.—M. S., 133, High-street, Chatham.

For washed or unwashed Dust from Hollow Flints, send stamped directed envelope to Rev. J. Greenly, Laverstock, Salisbury. Any microscopic material acceptable.

For sections of Charob seed, a good Polariscope Object, and Morva seed, showing Oleo-resin Cells, send stamped envelope and object of interest to R. H. Philip, 23, Prospect-street, Hull.

Feet of *Dytiscus marginalis*, showing the Suckers (mounted opaque), and Palates of Whelk, Limpet, and Periwinkle, prepared for mounting, for other good mounted Objects.—C. A. Grimes, 8, Crafford-street, Dover.

Withering's "British Botany" (Eighth Edition), cost 10s. 6d., for British Birds' Eggs, Coleoptera, Lepidoptera, or British Land or Fresh-water Shells.—F. M., 40, Bengal-street, Bradford.

Foraminiferous Sand from Dag's Bay and twenty other localities, various interesting Marine Material for micro objects, Algæ, Diatoms, Storm-tossed Scraps, Animal Parasites, Ferns and Rockwork Plants, carriage free, and several other things, for contributions towards the purchase of a good Microscope or Accessories.—T. McGann, Burrin, Ireland.

BOOKS, &c. RECEIVED.

"Economic Geology." By Professor D. Page. London: W. Blackwood & Sons.

"Reports of the Department of Agriculture" (United States), 1872 and 1873.

"Grevillea." December.

"Journal of Applied Science."

"Les Mondes."

"British Hepaticæ." Part 3.

"Botanische Zeitung."

"Astronomical Register." December.

"American Naturalist."

"Science at Home." By W. B. Woodbury.

Correspondence Received up to 12th ult. from:—M. H. R.—C. H. G.—Dr. C. C. A.—G. G.—J. F. R.—J. J.—F. C.—A. Q.—T. M. G.—C. A. G.—R. M.—J. P.—J. G. P. V.—F. R. M.—F. H. A.—J. S. H.—W. D. E.—W. H.—J. P. G.—R. A. B.—C. W. C.—W. H. P.—A. C.—J. P.—E. M. P.—C. W. C.—H. J. McG.—Dr. M.—J. W.—J. M—H. E. W.—H. J.—J. L. J.—A. H.—E. E.—T. B. W.—F. K.—M. C.—J. E. T.—M. K.—H. U.—Dr. C.—J. F. R.—E. P. C.—T. S.—M. D. R.—F. M.—R. T. L.—R. H. P.—H. C.—C. C. U.—R. G.—H. L.—C. S.—A. E. C.—T. G. P. Y.—W. H. P.—W. H. B.—R. S. L.—S. J. McI.—W. T.—W. H.—J. B.—J. C.—W. H. G.—F. J. A.—J. G. E.—J. G.—T. O. N.—G. P.—T. B.—R. R.—R. S.—M. D. R., &c.

A GOSSIP ABOUT NEW BOOKS.

THANKS to the intellectual activity of our numerous correspondents, the notices of several important volumes which have been forwarded us for review have had to lie by. As regards some of them, however, it would be unjust both to their authors and to such of our readers as have not yet been introduced to them, to postpone these brief notices any longer.

Undoubtedly the work which has most deservedly taken the attention of geologists for some time is Mr. James Geikie's "Great Ice Age" (London: W. Ibister & Co.). As the title suggests, this portly volume of nearly 600 pages is entirely devoted to the geology of that latest epoch, the "Glacial," when all our superficial beds of sand, clay, and gravel were formed. Mr. Geikie's style is simple and unpretentious. It is that of a man who, unlike Canning's "Knife-grinder," *has* a story to tell, and is too earnest in telling it to waste time in superfluous ornamentation. In its surpassing interest, the story of the "Drift" formation is not approached by that of any other great deposit. No formation testifies so largely to the industry of modern geologists as this, for it is not more than thirty years since the strata included in it were ascribed either to the Noachian Deluge, or to some sudden and violent cataclysm. Within that brief period geologists in all parts of the world have been investigating glacial phenomena, and studying the distribution of the surface deposits. Hundreds of papers have been read thereon in metropolitan and provincial societies, or written in scientific magazines. At length the truth began plainly to loom out of the dense fog, and geologists were rewarded for half their work by seeing their way clearer to the other half. Commencing with the *pre*-glacial beds in Britain, they discovered that an immense period of time was thoroughly represented by them and others, during which the climature of the Northern hemisphere, at least, underwent a rigorous change, so that an Arctic climate replaced the modern temperate. This phenomenon passed away as gradually as it came, leaving the *post*-glacial beds behind to testify to its close.

It is with this great subject that Mr. Geikie has elected to deal. A well-known "Drift" geologist himself, he has undertaken to examine, collate, and compare all that others have said or discovered. The result is this "Manual" of the glacial beds. One point particularly dwelt upon is the changes of climate which the author believes the Drift beds as a whole indicate. Mr. Geikie believes this change repeatedly occurred during the Glacial period, although we cannot but think he gives unnecessary importance to some of his illustrations, and is willing to accept facts of too local a character. Some geologists, also, will be inclined to disagree from the comparison he institutes between the ages of the Scotch and East Anglian drifts. These, however, are matters of small importance, and will inevitably be set right by the impetus which the publication of this book has given to this fascinating part of geology. What we have most to be thankful for is the clear and systematic account of the Glacial epoch here given; and the success which has already attended the sale of the book is the best proof that it has been widely appreciated.

Professor David Page's work on "Economic Geology" (London: W. Blackwood & Sons) is of more recent issue than that just noticed. It deals with a most important subject, and can hardly be said to have completely met it. Indeed, the author seems cognisant of this, for he invites further assistance and suggestion. The greatly increased number of objects of commercial importance with which geology now comes into contact, renders such a work as the present necessary. It is written in Mr. Page's usual calm philosophical style, and to the technical student is invaluable, not only for the large amount of information given, but also for the bibliographical references at the end of each chapter. By this means an investigator has his work much simplified, and is put upon the track of the information he seeks at once. Mining, agriculture, quarrying, chemistry, engineering of all kinds, materia medica, &c., all need some degree of the geological information which Professor Page here unfolds from his large stock. The book is a welcome addition to our geological literature, and is well worthy its author's reputation.

"The Naturalist in Nicaragua," by Mr. Thomas Belt (London: John Murray), has been published some months. Its success will therefore have already been heard of by many of our readers. For ourselves we confess to not having experienced such pleasure in reading any books of travel since Darwin's "Journal of a Naturalist," and Wallace's "Malayan Archipelago." Mr. Belt is an able naturalist and a keen observer, and this book is full of original observations of the most valuable kind, especially in relation to the subjects of *Mimicry*, the relations of birds and insects to flowers, &c. Mr. Belt is an evolutionist, and certainly one can hardly get away from such peculiar affinities and relationships as he narrates, without having recourse to the theory of natural selection. As far as the latter hypothesis goes, Mr. Belt's book is undoubtedly a valuable contribution. And the general reader cannot but be delighted with the vividly drawn scenes of other lands, and of their inhabitants, such as the author portrays on every page. We do not think Mr. Belt is so fortunate in his geological explanations as he is in his Natural History, although it is evident he attaches more importance to them himself. He believes the glacial agencies extended themselves to the equator, and that the low hills of the latter were once packed with ice. Nay, he even goes farther, and builds up a theory of the sea having stood in Equatorial regions at a thousand feet lower level during the Glacial epoch, owing to the water having been abstracted and turned into ice at each pole! We wish such theorists would remember that the formation of ice is quite as much a matter of *heat* as it is of *cold*—that we require open seas and hot suns in order to lift the vapours which, carried away, shall elsewhere be converted into snows! Therefore, as Professor Frankland showed some time ago, large quantities of ice in the shape of glaciers, in one part of the globe, can only be formed through the agency of intense heat in another.

"The Treasury of Botany" (London: Longmans & Co.), edited originally by Dr. Lindley and Thomas Moore, F.L.S., has obtained the confidence of botanists for many years, as a handy book of reference, containing a marvellous storehouse of trustworthy facts. The present new edition, therefore, which is in many places completely re-written, and everywhere revised, and which contains the newest views on structural, embryological, and teratological botany, cannot fail to attain a still higher status. Among the special contributors are the Rev. M. J. Berkeley, Dr. Masters, Prof. Balfour, Prof. Dyer, Prof. Dickie, Dr. Syme, Messrs. Carruthers, Britten, J. R. Jackson, Hemsley, &c. These names will be a guarantee for the trustworthiness of the matter, and the articles contributed by them have the initials of the authors affixed. The "Treasury of Botany" ought to be found on the shelves of every botanical library.

"Manuals of Botany" are not rare. Indeed, the difficulty is to steer clear of them, and were it not for the process of natural selection which is quietly eliminating the weakest, and putting them out of existence, the path of the botanical student would be sorely beset. It is with genuine pleasure, therefore, that we are able to notice a "Manual of Botany" by Robert Brown, Ph. D. (London: W. Blackwood & Sons). To prevent mistakes, it may be necessary to state that the work is not by the philosophical botanist of the same name, who has been long dead. Mr. Brown did good work as commandant of the Vancouver Exploring Expedition, to which—and also to the '67 Greenland Expedition—he acted as botanist. The present volume is wholly anatomical and physiological, and is illustrated by nearly 400 woodcuts. To the student, the chief value of the present manual consists in its including all the new aspects which botany has assumed since the revival of philosophical speculation. The author has allowed no lack of industry to interfere with his work—indeed, of the two, it betrays evidence of too much labour, rather than of too little; and here and there we notice signs of contradiction, due to immature digestion of the numerous memoirs and papers which Dr. Brown thought it necessary to read before he wrote. These, however, are almost necessary evils in a work like the present. On the whole we can conscientiously recommend the manual as a most useful, and, as regards the new opinions and views, a necessary one. It is well written, the woodcuts are excellent, and the type and paper both good.

Mr. F. W. Burbidge is well known as a horticultural botanist. His "Cool Orchids, and How to Grow them" (London: Hardwicke), is a capital handbook to the cultivation of this singular group of plants, a group daily becoming greater favourites. By "Cool" orchids the author means those which do not require any great degree of heat. There can be little doubt that these plants are largely coming into cultivation; and Mr. Burbidge shows that many species of them may be grown to perfection with the same trouble and expense required to grow a heath or an azalea. This little book, which is most tastefully got up and printed, is illustrated by woodcuts, of which one or two blocks that have been lent us, we are enabled to print as specimens. The most attractive features of the volume, however, are the coloured plates, which are got up with a brilliancy and artistic finish, as well as botanical truthfulness to tint and tone, such as is seldom seen in works of this kind. Nothing could more completely inform the orchid-grower as to the habits and requirements of these exotic plants, than the introductory chapters, all of which are abundantly illustrated, so as to make the diversion thoroughly successful. Another of Mr. Burbidge's books, recently published, is on "Domestic Floriculture" (London: W. Blackwood & Sons). It is devoted to window gardening and floral decorations, with living plants; and gives practical directions for the propagation, culture, and arrangement of plants and flowers as domestic ornaments. The illustrations are numerous, and of a very high order; and the text clearly printed, on good paper. As a "Manual" of domestic gardening, where out-door gardens are not available, or to administer to in-door tastes, we certainly have no rival to the present work.

Dr. Carpenter's new volume on "Mental Physiology" (London: H. S. King & Co.) occupies a good deal of debatable ground. It is written in that full yet pleasant style which has marked all the author's works. Although a large volume, the author regards it as an expansion of the outline of Psychology contained in the fourth and fifth editions of his "Principles of Human Physiology," published in 1855. Spiritualism, Mesmerism, and many other "isms," based upon an ignorance of physiology and psychology, which still hold half the unlettered or narrow-viewed people in the world in awe, come in for a vigorous and thoroughly exhaustive explanation and comparison, such as we have seen nowhere else. The close affinity, yet separate individuality, of body and mind are traced with a clearness almost surprising. Not the least interesting or important chapter in the work is that devoted to "Instincts." Natural History has thrown a light on psychology and general metaphysics within the last half-score years, such as was never expected; whilst since the publication of Bain's work, it has been impossible to study meta physics without a knowledge of physiology. The theory that instincts are only cumulative and transmitted habits, gained during the lifetime of the variety or species possessing them, enables us to

Fig. 16. *Cypripedium Faireanum*, from Burbidge's "Cool Orchids."

account for facts that would not otherwise have been explained. Viewed in this light, every Natural History anecdote assumes a greater importance, as forming an additional item in the study of the comparative psychology of the lower animals. A work on the latter subject is much required, and will some day be written; but we question whether observation has yet accumulated sufficient material. We hardly need say that Dr. Carpenter's book includes all the newest views and speculations, not excepting those of Dr. Ferrier. We have enjoyed its perusal with zest, and heartily commend it to the notice of our readers.

Fig. 17. *Cattleya Trianiæ*, one of the most easily-grown Orchids.

Books on this and kindred subjects have multiplied since Darwin's work on "The Emotions" was published. One of the latest is on "The Physics and Physiology of the Senses" (London: Henry S. King & Co.), by R. S. Wyld, F.R.S.E. It covers much of the same ground as Dr. Carpenter's work, dealing with the mental and the physical in their mutual relationships. In a great measure we may regard this thoughtful and well-written book as a "Manual of the Senses," whilst the latter part is devoted to a philosophical treatment and general comparison of the whole subject. The author adopts a *dynamical* theory as the true foundation of philosophy. In the short space at our disposal, we can only notice this valuable and carefully written work, and refer our readers to it for a fuller satisfaction.

Dr. Ross's essay "On Protoplasm" (London: Hardwicke) is boldy speculative, and loyally Huxleyan. It is an examination of Dr. James Hutchinson Sterling's criticism of Huxley's views, and the latter philosopher cannot complain of the lack of a sincere disciple. Dr. Ross is a hard hitter, and has the power of marshalling his facts in clear and telling order; and though he has chosen to measure swords with one of the most skilled debaters of the present day, Dr. Sterling will find him a foeman worthy of his steel. We regard this essay as a very valuable addition to the literature of the subject here discussed. With these words of brief comment on the books above-named, we leave them with our friends for further examination and study.

NEWS FROM THE "CHALLENGER."

PROF. WYVILLE THOMSON, the chief of the Scientific Staff on board the *Challenger*, has forwarded a paper to the Royal Society, of which the following, relating to the physical nature of the ocean-bed, is a part. He says:—During our southern cruise the sounding-lead brought up five absolutely distinct kinds of sea-bottom, without taking into account the rock and detritus of shallow soundings in the neighbourhood of land. Our first two soundings in 98 and 150 fathoms, on the 17th and 18th of December, were in the region of the Agulhas current. These soundings would have been naturally logged "greenish sand," but on examining the sandy particles with the microscope, they were found to consist almost without exception of the casts of foraminifera in one of the complex silicates of alumina, iron, and potash, probably some form of glauconite. The genera principally represented by these casts were *Miliola*, *Biloculina*, *Uvigerina*, *Planorbulina*, *Rotalia*, *Textularia*, *Bulimina*, and *Nummulina; Globigerina*, *Orbulina*, and *Pulvinulina* were present, but not nearly in so great abundance. There were very few foraminifera on the surface of the sea at the time. This kind of bottom has been met with once or twice before; but it is evidently exceptional, depending upon some peculiar local conditions.

From the Cape, as far south as our station in lat. 46° 16′, we found no depth greater than 1,900 fathoms, and the bottom was in every case "Globigerina ooze"; that is to say, it consisted of little else than the shells of Globigerina, whole, or more or less broken up, with a small proportion of the shells of *Pulvinulina* and of *Orbulina*, and the spines and tests of radiolarians and fragments of the spicules of sponges. Mr. Murray has been paying the closest attention since the time of our departure to the question of the origin of this calcareous formation, which is of so great interest and importance on account of its anomalous character and its enormous extension. Very early in the voyage he formed the opinion that all the organisms entering into its composition at the bottom are dead, and that all of them live abundantly at the surface and at intermediate depths over the Globigerina-ooze area, the ooze being formed by the subsiding of these shells to the bottom after death.

This is by no means a new view. It was advocated by the late Prof. Bailey, of West Point, shortly after the discovery that such a formation had a wide extension in the Atlantic. Johannes Müller, Count Pourtales, Krohn, and Max-Schultze, observed Globigerina and Orbulina living on the surface; and Ernst Hæckel, in his important work upon the Radiolaria, remarks that "we often find upon, and carried along by the floating pieces of seaweed which are so frequently met with in all seas, foraminifera as well as other animal forms which habitually live at the bottom." However, setting aside these accidental instances, certain foraminifera, particularly in their younger stages, occur in some localities so constantly and in such numbers, floating on the surface of the sea, that the suspicion seems justifiable that they possess, at all events at a certain period of their existence, a pelagic mode of life, differing in this respect from most of the remainder of their class. Thus Müller often found in the contents of the surface-net off the coast of France the young of Rotalia, but more particularly Globigerinæ and Orbulinæ, the two latter frequently covered with fine calcareous tubes, prolongations of the borders of the fine pores through which the pseudogradia protrude through the shell. I took similar Globigerinæ and Orbulinæ almost daily in a fine net at Messina, often in great numbers, particularly in February. Often the shell was covered with a whole forest of extremely long and delicate calcareous tubes projecting from all sides, and probably contributing essentially to enable these little animals to float below the surface of the water by increasing their surface greatly, and consequently their friction against the water, and rendering it more difficult for them to sink. In 1865 and 1866 two papers were read by Major Owen, F.L.S., before the Linnean Society, "On the Surface Fauna of Mid-Ocean." In these communications the author stated that he had taken foraminifera of the genera Globigerina and Pulvinulina, living, in the tow-net on the surface, at many stations in the Indian and Atlantic Oceans. He described the special forms of these genera which were most common, and gave an interesting account of their habits, proposing for a family which should include Globigerina, with Orbulina as a sub-genus, and Pulvinulina, the name Colymbitæ, from the circumstance that, like the Radiolaria, these foraminifera are found on the surface after sunset, "diving" to some depth beneath it during the heat of the day. Our colleague, Mr. Gwyn Jeffreys, chiefly on the strength of Major Owen's papers, maintained that certain foraminifera were surface animals, in opposition to Dr. Carpenter and myself. I had formed and expressed a very strong opinion on the matter. It seemed to me that the evidence was conclusive that the foraminifera which formed the Globigerina ooze lived on the bottom, and that the occurrence of individuals on the surface was accidental and exceptional; but after going into the thing carefully, and considering the mass of evidence which has been accumulated by Mr. Murray, I now admit that I was in error; and I agree with him that it may be taken as proved that all the materials of such deposits, with the exception, of course, of the remains of animals which we now know to live at the bottom at all depths, which occur in the deposit as foreign bodies, are derived from the surface.

Mr. Murray has combined with a careful examination of the soundings a constant use of the tow-net, usually at the surface, but also at depths of from ten to one hundred fathoms; and he finds the closest relation to exist between the surface fauna of any particular locality and the deposit which is taking place at the bottom. In all seas, from the equator to the polar ice, the tow-net contains Globigerinæ. They are more abundant and of a larger size in warmer seas; several varieties, attaining a large size and presenting marked varietal characters, are found in the intertropical area of the Atlantic. In the latitude of Kerguelen they are less numerous and smaller, while further south they are still more dwarfed, and only one variety, the typical *Globigerina bulloides*, is represented. The living Globigerinæ from the tow-net are singularly different in appearance from the dead shells we find at the bottom. The shell is clear and transparent, and each of the pores which penetrates it is surrounded by a raised crest, the crest round adjacent pores coalescing into a roughly hexagonal network, so that the pores appear to lie at the bottom of a hexagonal pit. At each angle of this hexagon the crest gives off a delicate flexible calcareous spine, which is sometimes four or five times the diameter of the shell in length. The spines radiate symmetrically from the direction of the centre of each chamber of the shell, and the sheaves of long transparent needles crossing one another in different directions have a very beautiful effect. The smaller inner chambers of the shell are entirely filled with an orange-yellow granular sarcode; and the large terminal chamber usually contains only a small irregular mass, or two or three small masses run together, of the same yellow sarcode stuck against one side, the remainder of the chamber being empty. No definite arrangement and no approach to structure was observed in the sarcode, and no differentiation, with the exception of round bright-yellow oil-globules, very much like those found in some of the radiolarians, which are scattered apparently irregularly in the sarcode. We never have been able to detect in any of the large number of Globigerinæ which we have examined the least trace of pseudopodia, or any extension in any form of the sarcode beyond the shell.

Major Owen has referred the Globigerina with spines to a distinct species, under the name of *G. hirsuta*. I am inclined rather to believe that all Globigerinæ are to a greater or less degree spiny when the shell has attained its full development. In specimens taken with the tow-net the spines are very usually absent; but that is probably on account of their extreme tenuity; they are broken off by the slightest touch. In fresh examples from the surface, the dots indicating the origin of the lost spines may almost always be made out with a high power. There are never spines on the Globigerinæ from the bottom, even in the shallowest water. Two or three very marked varieties of Globigerina occur; but I certainly do not think that the characters of any of them can be regarded as of specific value.

There is still a good deal of obscurity about the nature of *Orbulina universa*, an organism which occurs in some places in large proportion in the Globigerina ooze. The shell of Orbulina is spherical, usually about ·5 millimetre in diameter, but it is found of all smaller sizes. The texture of the mature shell resembles closely that of Globigerina, but it differs in some important particulars. The pores are markedly of two different sizes, the larger about four times the area of the smaller. The larger pores are the less numerous; they are scattered over the surface of the shell without any appearance of regularity; the smaller pores occupy the spaces between the larger. The crests between the pores are much less regular in Orbulina than they are in Globigerina; and the spines, which are of great length and extreme tenuity, seem rather to arise abruptly from the top of scattered papillæ than to mark the intersections of the crest. This origin of the spines from the papillæ can be well seen with a moderate power on the periphery of the sphere. The spines are hollow and flexible; they naturally radiate regularly from the direction of the centre of the sphere; but in specimens which have been placed under the microscope with the greatest care, they are usually entangled together in twisted bundles. They are so fragile that the weight of the shell itself, rolling about with the motion of the ship, is usually sufficient to break off the whole of the spines and leave the papillæ only projecting from its surface in the course of a few minutes. In some examples, either those in process of development, or a series showing a varietal divergence from the ordinary type, the shell is very thin and almost perfectly smooth, with neither papillæ nor spines, nor any visible structure, except the two classes of pores, which are constant.

The chamber of Orbulina is often almost empty; even in the case of examples from the surface, which appears from the freshness and transparency of the shell to be living, it is never full of sarcode; but it frequently contains a small quantity of yellow sarcode stuck against one side, as in the last chamber of Globigerina. Sometimes, but by no means constantly, within the chamber of Orbulina there is a little chain of three or four small chambers singularly resembling in form, in proportion, and in sculpture, a small Globigerina; and sometimes, but again by no means constantly, spines are developed on the surface of the calcareous walls of these inner chambers, like those on the test of Globigerina. The spines radiate from the position of the centre of the chambers and abut against the insides of the wall of the Orbulina. In a few cases the inner chambers have been observed apparently arising within or among the sarcode adhering to the wall of the Orbulina.

Major Owen regards Orbulina as a distinct organism, nearly allied to Globigerina, but differing so far from it as to justify its separation into a special subgenus. He considers the small inner chamber of Orbulina as representing the smaller chamber of Globigerina, and the outer wall as the equivalent of the large outer chamber of Globigerina developed in this form as an investing chamber. Count Pourtales, Max-Schultze, and Krohn, on the other hand, believe, on account of the close resemblance in structure between the two shells, their constant association, and the undoubted fact that an object closely resembling a young Globigerina is often found within Orbulina, that the latter is simply a special reproductive chamber budded from the former, and capable of existing independently. I am rather inclined to the latter view, although I think much careful observation is still required to substantiate it; and some even of our own observations would seem to tell somewhat in the opposite direction. Although Orbulina and Globigerina are very usually associated, in different localities, they are so in different proportions; and in the icy sea to the south of Kerguelen, although Globigerina was constantly taken in the surface-net, not a single Orbulina was detected. Like Globigerina, Orbulina is most fully developed and most abundant in the warmer seas.

Associated with these forms, and, like them, living on the surface and dead, and with their shells in various stages of decay at the bottom, there are two very marked species or varieties of Pulvinulina, *P. Menardii*, and *P. micheliniana*. The general structure of Pulvinulina resembles that of Globigerina. The shell consists of a congeries of from five to eight chambers arranged in an irregular spiral. As in Globigerina, the last chamber is the largest; the inner smaller chambers are usually filled with yellow sarcode; and as in Globigerina, the last chamber is frequently nearly empty, a small irregular mass of sarcode only occupying a part of the cavity. The walls of the chambers are closely and minutely perforated. The external surface of the wall is nearly smooth, and no trace of a spine has ever been detected. *Pulvinulina Menardii* has a large discoidal depressed shell, in diameter consisting of a series of flat chambers overlapping one another, like a number of coins laid down somewhat irregularly, but generally in a spiral: each chamber is bordered by a distinct somewhat thickened solid rim of definite width. On the lower surface of the shell the intervals between the chambers are indicated by deep grooves. The large irregular opening of the final chamber is protected by a crescentic lip, which in some specimens bears a fringe of spine-like papillæ. This form is almost confined to the warmer seas. It is very abundant on the surface, and still more so during the day, at a depth of ten to twenty fathoms in the Mid-Atlantic; and it enters into the composition of the very characteristic Globigerina ooze of the "Dolphin Rise" in almost as large proportions as Globigerina. *Pulvinulina micheliniana* is a smaller variety; the upper surface of the shell is flattened as in *P. Menardii*, but the chambers are conical and prolonged downwards, so that the shell is deeper and somewhat turbinate. The two species usually occur together; but *P. micheliniana* has apparently a much wider distribution than *P. Menardii*, in which the former was limited to the region of the trade-winds and the equatorial drift-current, and was found rarely, if at all, to the south of the Agulhas current; the latter accompanied us southward as far as Kerguelen Land. Both forms of Pulvinulina, however, are more restricted than Globigerina, for even *P. micheliniana* became scarce after leaving the Cape, and the wonderfully pure calcareous formation in the neighbourhood of Prince Edward Island and the Crozets consists almost solely of *Globigerina bulloides*; and neither species of Pulvinulina occurred to the south of Kerguelen Land.

Over a very large part of the "Globigerina-ooze" area, and especially in those intertropical regions in which the formation is most characteristically developed, although the great bulk of the ooze is made up of entire shells and fragments of shells of the above-described foraminifera, besides these there is frequently a considerable proportion (amounting in some cases to about twenty per cent.) of fine granular matter, which fills the shells and the interstices between them, and forms a kind of matrix or cement. This granular substance is, like the shells, calcareous, disappearing in weak acid to a small insoluble residue: with a low microscopic power it appears amorphous, and it is likely to be regarded at first sight as a paste made up of the ultimate calcareous particles of the disintegrated shells, but under a higher power it is found to consist almost entirely of "coccoliths" and "rhabdoliths." I need scarcely enter here into a detailed description of these singular bodies, which have already been carefully studied by Huxley, Sorby, Gümbel, Carter, Oscar Schmidt, Wallich, and others. I need only state that I believe our observations have placed it beyond a doubt that the "coccoliths" are the separated elements of a peculiar calcareous armature which covers certain spherical bodies (the "coccospheres" of Dr. Wallich). The rhabdoliths are the like elements of the armature of extremely beautiful little bodies, which have been first observed by Mr. Murray, and naturally called by him "rhabdospheres." Coccospheres and rhabdospheres live abundantly on the surface, especially in warmer seas. If a bucket of water be allowed to stand over night with a few pieces of thread in it, on examining the threads carefully many examples may usually be found attached to them; but Mr. Murray has found an unfailing supply of all forms in the stomachs of Salpæ.

What these coccospheres and rhabdospheres are we are not yet in a position to say with certainty; but our strong impression is that they are either algæ of a peculiar form, or the reproductive gemmules, or the sporangia of some minute organism, probably an alga, in which latter case the coccoliths and rhabdoliths might be regarded as representing in position and function the "amphidisci" on the surface of the gemmules of Spongilla, or the spiny facets on the zygospores of many of the Desmideæ. There are many forms of coccoliths and rhabdoliths, and many of these are so distinct that they evidently indicate different species. Mr. Murray believes, however, that only one form is met with on one sphere; and that in order to produce the numerous forms figured by Hæckel and Oscar Schmidt, all of which, and many additonal varieties, he has observed, the spheres must vary in age and development, or in kind. Their constant presence in the surface-net, in surface-water drawn in a bucket, and in the stomachs of surface animals, sufficiently proves that, like the ooze-forming foraminifera, the coccoliths and rhabdoliths, which enter so largely into the composition of the recent deep-sea calcareous formations, live on the surface and at intermediate depths, and sink to the bottom after death. Coccospheres and rhabdospheres have a very wide but not an unlimited distribution. From the Cape of Good Hope they rapidly decreased in number on the surface, and at the bottom as we progressed southwards. The proportion of their remains in the Globigerina ooze near the Crozets and Prince Edward Island was comparatively small; and to this circumstance the extreme clearness and the unusual appearance of being composed of Globigerinæ alone was probably mainly due. We found the same kind of ooze nearly free from coccoliths and rhabdoliths in what may be considered about a corresponding latitude in the north, to the west of Faröe. Before leaving the subject of the modern chalk, it may be convenient to pass on to stations 158, 159, and 160, on March 7th, 10th, and 13th, on our return voyage from the ice. The first two of these, at depths of 1,800 and 2,150 fathoms respectively, are marked on the chart "Globigerina ooze"; and it will be observed that these soundings nearly correspond in latitude with the like belt which we crossed going southwards; the third sounding at a depth of 2,600 fathoms is marked "red clay."

According to our present experience, the deposit of Globigerina ooze is limited to water of a certain depth, the extreme limit of the pure characteristic formation being placed at a depth of somewhere about 2,250 fathoms. Crossing from these shallower regions occupied by the ooze into deeper soundings, we find universally that the calcareous formation gradually passes into and is finally replaced by an extremely fine pure clay, which occupies, speaking generally, all depths below 2,500 fathoms, and consists almost entirely of a silicate of the red oxide of iron and alumina. The transition is very slow, and extends over several hundred fathoms of increasing depth; the shells gradually lose their sharpness of outline and assume a kind of "rotten" look and a brownish colour, and become more and more mixed with a fine amorphous red-brown powder, which increases steadily in proportion until the lime has almost entirely disappeared. This brown matter is in the finest possible state of subdivision, so fine that when, after sifting it to separate any organisms it might contain, we put it into jars to settle, it remained for days in suspension, giving the water very much the appearance and colour of chocolate. In indicating the nature of the bottom on the charts, we came, from experience and without any theoretical consideration, to use three terms for soundings in deep water. Two of these, Gl. oz. and r. cl., where very definite, and indicated strongly-marked formations, with apparently but few characters in common; but we frequently got soundings which we could not exactly call either "Globigerina ooze" or "red clay"; and before we were fully aware of the nature of these we were in the habit of indicating them as "grey ooze" (gr. oz.). We now recognize the "grey ooze" as an intermediate stage between the Globigerina ooze and the red clay; we find that on one side, as it were, of an ideal line, the red clay contains more and more of the material of the calcareous ooze, while on the other the ooze is mixed with an increasing proportion of "red clay."

Although we have met with the same phenomenon so frequently that we were at length able to predict the nature of the bottom from the depth of the sounds with absolute certainty for the Atlantic and the Southern Sea, we had perhaps the best opportunity of observing it in our first section across the Atlantic, between Teneriffe and St. Thomas. The first four stations on this section, at depths from 1,525 to 2,220 fathoms, show Globigerina ooze. From the last of these, which is about 300 miles from Teneriffe, the depth gradually increases to 2,740 fathoms at 500, and 2,950 fathoms at 750 miles from Teneriffe. The bottom in these two soundings might have been called "grey ooze"; for although its nature has altered entirely from the Globigerina ooze, the red clay into which it is rapidly passing still contains a considerable admixture of carbonate of lime.

The depth goes on increasing to a distance of 1,150 miles from Teneriffe, when it reaches 3,150 fathoms; there the clay is pure and smooth, and contains scarcely a trace of lime. From this great depth the bottom gradually rises, and with decreasing depth the grey colour and the calcareous composition of the ooze return. Three soundings in 2,050, 1,900, and 1,950 fathoms on the "Dolphin Rise," gave highly characteristic examples of the Globigerina formation. Passing from the middle plateau of the Atlantic into the western trough, with depths a little over 3,000 fathoms, the red clay returned in all its purity; and our last sounding in 1,420 fathoms before reaching Sombrero, restored the Globigerina ooze with its peculiar associated fauna. This section shows also the wide extension and the vast geological importance of the red clay formation. The total distance from Teneriffe to Sombrero is about 2,700 miles. Proceeding from east to west, we have about 80 miles of volcanic mud and sand, about 350 miles of Globigerina ooze, about 1,050 miles of red clay, about 330 miles of Globigerina ooze, about 850 miles of red clay, about 40 miles of Globigerina ooze; giving a total of 1,900 miles of red clay to 720 miles of Globigerina ooze.

THE DEVELOPMENT OF LOPHOPUS CRYSTALLINA FROM STATOBLAST.

In my paper on the Lophopus in last December's Science-Gossip, page 270, I stated that I had seen the dissolution of some of their colonies, and had preserved in glass cells the statoblast that had become free in the water at their death,

Fig. 18. Statoblast of *Lophopus crystallina.*

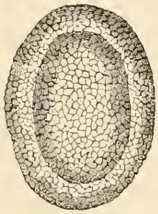


Fig. 19. Statoblast of *Plumatella repens.*

anticipating the pleasure of seeing the young polyzoon issue therefrom in due time, which I supposed would not take place before next spring, as the

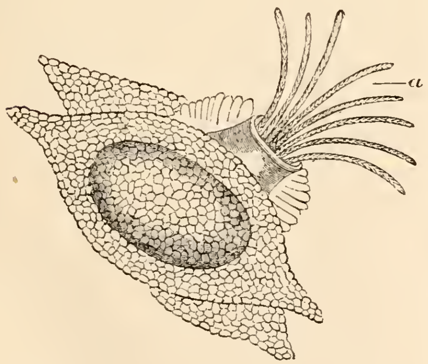


Fig. 20. Polyzoa protruding from Statoblast of *Lophopus.*

statoblast is generally considered a sort of winter egg, similar to the Ephiphia of the *Daphnea pulex*, &c. But these statoblasts which had been in the glass cell (eight in number) were the produce of two colonies that I had under observation since July 25, 1874, and they had gradually died away. October 1, they were placed, still containing the statoblast, in a cell by themselves, and the statoblast became quite free in a short time, and so remained in the water. October 29, I observed that one of them had begun to open, and in a short time the

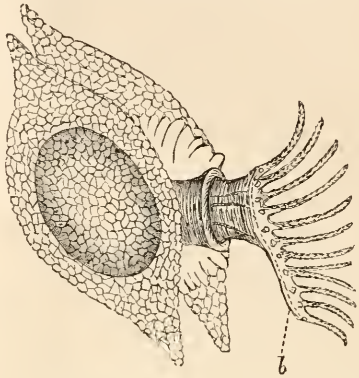


Fig. 21. Further development of Polyzoa from Statoblast.

tentacles were seen protruding from out of the cell (as shown in fig. 20, *a*), the cilia on them in rapid motion. In two days the whole of the eight were seen emerging from statoblast, by which time, those that were first seen had advanced as shown in fig. 21,

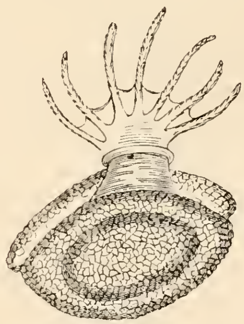


Fig. 22. Polyzoa emerging from Statoblast of *Plumatella.*

with the Lophophore, *b*, and its crown of tentacles complete. The cilia on them were in full play in every respect like the parent (size only excepted), and were slowly moving about the cell, bearing with them the statoblast, which opens in a similar manner to a bivalve shell. In this state they were exhibited at the monthly meeting of the East Kent Natural History Society, proving novel and interesting objects to the members present.

It would appear by this early development in so short a time, that they do not at all times lay during the whole winter and hatch in the spring. I have statoblasts that were set free from other colonies about August 10th, and they as yet show no signs of developing. The same thing has taken place with the statoblast of *Plumatella repens*, some of which I placed in a cell by themselves August 10th, having had them some time previous under observation. October 1st, several of the young were seen protruding from the statoblast (fig. 22), while others of the *Plumatella* also are still undeveloped in the same cell, and probably will remain so until the coming spring. This apparent irregularity in the time of hatching I have noticed also in the *Hydra viridis*. Some of them have been hatched in the space of five weeks, and others have lain five months before it has taken place The young *Lophopus* lived for two months, and did not quit the statoblast case during that time, but all of them have since died, so that further observations on their growth could not be made. I watched them carefully, in the hope of seeing fresh colonies formed by the process of gemmation; for this, however, I must wait another opportunity. The young are capable of regular exsertion and retraction, as the parent animal, and the process of feeding, and the action of the stomach in the work of digestion is plainly seen, so far as the protrusion of the body out of the case will allow. The length of the statoblast of *Lophopus* is about 3-100 of an inch.

Canterbury. JAMES FULLAGAR.

HOLIDAY RAMBLES.

No. IV.—A DAY'S BOTANIZING ON THE SUSSEX COAST.

AUGUST the 3rd last, being a Bank Holiday, was chosen by some Cicestrian and neighbouring naturalists for investigating the flora and other productions of a promising part of our South Coast, a district well searched long ago by Dillenius and by Borrer. Notes had been made of plants observed there by them, and specially to be looked for. The programme was to first visit Itchenor and Wittering, and then to push eastward, so long as daylight would allow, towards Bracklesham Bay. A delightful breezy morning, neither too hot nor too cold, gave promise of the pleasant excursion which ensued. Arriving at Itchenor, we had the great advantage of being joined by the rector of the parish, an ardent naturalist, well acquainted with the locality, and who throughout the day acted as our pioneer, over hedge and ditch, through wood and marsh skirting Chichester Harbour. Our cryptogamists were the first to be delighted. Harvesting was going on, and from a cornfield a friend brought some unusually handsome specimens of *Polyporus lucidus*,—their shining, varnished, bright chestnut-edged pileii, curiously enclosing straws and ivy-leaves; and their remarkable stems were so striking that an artist of our party at once determined on portraying them in oils, which he did most happily. Not long after occurred *Uromyces Limonii*, and *Æcidium statices*, on the Sea Lavender. The phanerogams, however, were our chief reward. As we passed through Itchenor Park towards the sea, we came upon the Corn Spurrey (*Spergula arvensis*) and the not uncommon Bristly Ox-tongue (*Helminthia echioides*). Then in the marshes were whole tracts covered with the Marsh Mallow in full bloom. This plant was noted as local; scarce nearer Chichester, although appearing plentifully on the banks of the Arun. By the shore appeared the English Stonecrop (*Sedum anglicum*): it had been observed at Hayling Island, and was one of the plants to be looked for, since it had been found by Dillenius further on at Bracklesham, in one of his journeys. Its pretty white flowers speckled with red were for the most part faded. This Stonecrop was so plentiful that its extirpation need not be feared, and the habitat is therefore given. Near it, but for the most part separate, was *Sedum acre*, with its yellow blossoms still visible. We next came on large patches of tansy, its strongly-scented flowers giving rise to a question relative to tansy puddings—whether they could have been nice or not. With it grew abundantly the Sea Wormwood, here called Savin, and used for deleterious purposes too generally known. The Sea Beet, Sea Purslane, and several of the oraches, abounded; amongst them a single example of the Frosted Sea Orache (*Atriplex arenaria*). While this was being examined, one who knew the coast exclaimed, "Yonder is *Ellanore*, the spot where Ella, the father of Cissa, landed when he conquered Sussex."

The Strawberry-headed Trefoil, the Black Saltwort, and the Greater Skull-cap were now met with, while *Juncus maritimus* was also observable. On its stems and flowers were numbers of the pretty Burnet Moth, with many a deserted pupa-case. The remarkable cedar-like odour which this rush emits when pulled up attracted much attention. *Salicornia radicans*, with its conspicuous tinge of fawn-colour, was a characteristic of this part of Chichester Harbour, occurring in profusion, as did *Silene maritima*, which, we were told, as early as May covers large portions of the shore here with its snowy blossoms. Arriving at Cockbush, one of the Compositæ—the Sea Feverfew (*Pyrethrum maritimum* of Smith and *Chrysanthemum maritimum*), was *the* plant we sought chiefly to meet with, and there it was to be seen abundantly. Dillenius had thus noted its station: "At Cockbush, on the Sussex coast, seven miles from Chichester, in plenty." Reckoned formerly as a distinct species, but now reduced to a variety, *Matricaria inodora*, var. *C. maritimum;* some of us were of Smith's opinion, that as a species it was "abundantly distinct," while all agreed that to a plant so decidedly aromatic the specific name *inodorum* was evidently a misnomer. Old Gerard's words on the Mayweed, too, were quoted: "There be three kinds, one stinking and the other two not stinking; and besides there is another, voyd of smell." To determine which of these was our plant was a matter of still greater difficulty. *Matricaria chamomilla* we found also an inhabitant of the neighbourhood.

From Cockbush a fine view of the Channel is to be obtained, and of a telescope, lent by the coastguard, we now availed ourselves, for a final westward glance at the Isle of Wight in the distance.

Many common though handsome plants, as the Saw-wort, the Pink Centaury, and a remarkably-coloured Polygala, had been consigned to our wallet; and taking leave of our flora, as the sun was setting behind us, we traversed the sands, strewn with nummulites, along the wide sweep of Bracklesham Bay. On our return home, by way of digression from botanical topics, we listened to narratives of the daring deeds of the Sussex smugglers of the district, by one who had long known it, and to an account of the fearful wreck of the *Robinson* man-of-war, near Selsey Bill, and were reminded of some of her guns, still lying in Chichester. We reached the ancient Cross at half-past nine, after a most successful holiday ramble, to re-examine our floral acquisitions, and to experience the benefit of our bracing walk, on the morrow.

F. H. Arnold, LL.B.

THE HISTORY OF CULTIVATED VEGETABLES.

No. IX.—The Kidney-bean (*Phaseolus*).

It is said that we are indebted to Alexander the Great for the introduction of this bean into Europe, for while marching on his victorious route in India his eyes fell upon a field of these plants. They appeared to him very inviting, and finding them good for food, he highly recommended them to his countrymen. In ancient Greece and Italy this vegetable found a distinguished place at the tables of the wealthy. In the former country they were served in their green state, together with figs and other side dishes. The Romans preserved them with vinegar and garum (a kind of lorime), and they were handed round at the beginning of a feast to excite the appetites of the guests. Pliny, in the seventh chapter of his eighteenth book, mentions these beans, and says those of Sesama and Iris are red, resembling blood. He also, in his twelfth chapter of the same book, called them *Phaseli*, and says the pod is to be eaten with the seed. It is probable that these beans were first introduced into this country from the Netherlands, about the year 1509, when gardening first began to be attended to in England; the white Dutch kidney-bean having been the earliest sort known in this kingdom. The old French name for this vegetable was *Fèves* de Rome, which evidently proves that they were introduced into that country from Italy; and about the time of Queen Elizabeth we find it called the "Roman Bean." Gerard gives it also the name of "Sperage Bean," and says it is called *Faselles*, or long peason. He mentions that a considerable variety was cultivated in England in his time, and says, "The fruit and pods of kidney-beans boiled together before they be ripe, and so eaten, are exceeding delicate meat." This medical herbalist adds, "they are gently laxative, and ingender good blood."

Kidney-beans are amongst the most valuable of culinary vegetables, yielding a large return crop, and continuing in use during the whole summer. The ripe seeds are much used on the Continent in cooking, under the name of "Haricots," which as dishes are as numerous as curries in Calcutta. It is stated that the Nubians boil the leaves of the kidney-bean, and consider them an excellent dish. Major Denham mentions four kinds of beans raised in Bornou. A paste made of them and fish was the only eatable which this traveller and his companions could find in the towns near the river.

The seed of the large kidney-bean (*Fève haricot*) sliced and stewed in milk, is a frequent dish at the farm-houses in Flanders.

The scarlet-runner (*Phaseolus multiflorus*) was brought into this country from South America, in 1633, and was first cultivated at Lambeth, by Tradescent, but it was merely planted as an ornament to cover walls, and to form arbours, without an idea of cooking the pods for the table. Its flowers were in great favour for nosegays, but its legumes did not come into general use as an edible vegetable until brought into notice by Miller in the eighteenth century.

Phillips relates that some years ago the French had a prejudice against this plant nearly equal to the superstition of the ancients respecting the bean (*Faba*), on account of the scarlet or blood-coloured blossom; but now it is largely cultivated in France, and almost all over the Continent, not only for the green pods, but also for its ripened seeds, which are eaten in haricots or put into soups.

The scarlet-runner, although in general cultivated as and considered to be an annual, like the kidney-bean, is truly perennial. It also deserves notice that in their spiral habit of growth the tendrils turn to the right, or in a direction contrary to the apparent diurnal course of the sun. This aberration from the common habits of plants has been accounted for by supposing that the native climate of the scarlet-runner will be found to lie south of the equator, and that the plant, although removed to the northern hemisphere, is still obedient to the course originally assigned to it, turning in a direction which in its native climate would be towards the sun.

Some varieties of the kidney-bean are found in cultivation throughout almost every civilized country of the western as well as the eastern hemisphere. H. G. Glasspoole.

THE AMERICAN CHIP-MUCK.

(*Tamias Lysteri.*)

By Charles C. Abbott, M.D.

With the first sweet blossoms of the Epigæa, and long before the foremost warbler greets his old-time home with gleesome songs, our little Chip-muck has roused himself from his long winter's nap, and sniffing the south wind, as it whirls the dead leaves about, scampers to and fro while the sun shines, and dives into his winter quarters, it may be for a whole week, if the north wind whispers to the tall beech-trees. But the blustering days of March give way in due time to showery April, and then, with more courage, "chip" faces the music of the winds, blow they from whatever quarter, and darting along the top rail of our zig-zag fences, chatters, scolds, and calls at and to his equally noisy companions. They know full well that they have the summer before them, and while determined to enjoy it, begin early and in good earnest to make arrangements for its coming duties. We watched several pairs of them from March to November, during the last year (1874), and our sketch is based on numerous notes made at different times.

Until the weather became fairly settled, and really spring-like in temperature, these little chip-mucks did not frequently show themselves, and then only in the middle of the day. The occurrence of a cold storm they appeared to foretell by twenty-four hours, and resumed their hybernating sleep, becoming lethargic, and very difficult to restore to consciousness. A pair that we dug out in March, having two days before re-entered their winter quarters and become again torpid, were apparently lifeless when first taken up in the hands, and not until after several hours' warming did they become lively and altogether themselves again. This seemed to us the more curious, in that they can respond to a favourable change in the weather in a short time, even when the thermometric change is really but a few degrees.

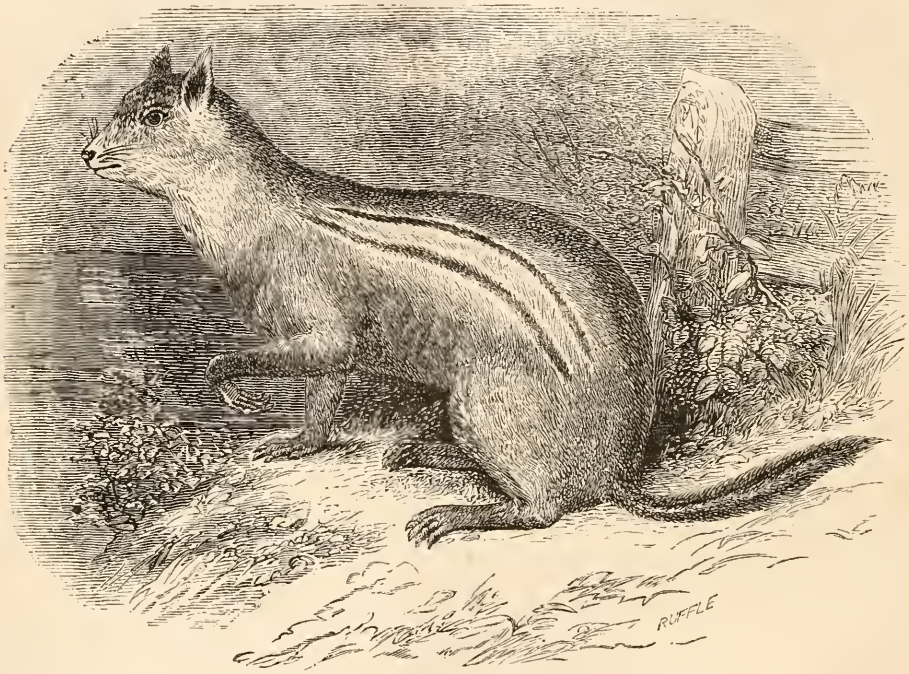


Fig. 23. American "Chip-muck" (*Tamias Lysteri*), half natural size.

On the 3rd of May a pair made their appearance in the yard of our residence, and took up their abode in a stone wall having a southern outlook, and on the edge of a steep descent of seventy feet; which hillside is thickly wooded, and harbours scores of these little chip-mucks, or "ground squirrels," as they are more commonly called. From the fact of these little animals living wholly underground, and it being stated that their underground homes were quite elaborate in structure, we determined to wait until the pair in our yard had completed their excavations in and under the stone wall, and arranged their nest, which time we judged by their actions, and then seeking out the home of another couple, which was readily accessible, we undertook to expose the nest and its approaches. This we did on May 29th. The general character of the nest and its approaches are seen in the sketch. The

Fig. 24. Nest of American "Chip muck" (*Tamias Lysteri*).

nest contained five young, not more than forty-eight hours old. The two entrances were at the foot of a large beech-tree standing about six feet from the brow of the hill. The grass alone grew about the tree, and the holes on the surface of the ground were very conspicuous. No attempt at concealment had been made; but this was evidently because there is here almost a total absence of their particular enemies. Animals soon learn this fact, and their homes and habits vary with the knowledge. From the right-hand entrance to the nest was an intervening space of nine feet traversed by a cylindrical passage somewhat serpentine in its course, which made the distance really about twelve feet. The nest itself was oval, about 20 inches in length (the cut makes it appear too large) and 10 inches in height. It was lined with very fine grass. We had hoped to find several passages leading from the nest, and two or more "extra" nests, or magazines for storing away food, but no trace of them was to be found.

On the 23rd of June, six young chip-mucks made their appearance, about the stone wall in the yard, and to these, with their parents, we will now confine our attention. It puzzles us now, when we think of it, to imagine when this company of eight chip-mucks took any rest. Very frequently during the summer we were astir at sunrise, but the chip-mucks were already on the go, and throughout July they appeared to do little but play; which sporting, by the way, is very animated. They seem to be playing at what children know as "tag," *i. e.*, they chase each other to and fro, and try, we should judge, to bite each others' tails. The way in which they scamper along the tapering points of a paling fence is simply astonishing; but however mad may be their galloping, let a hawk come near, and in a moment every one is motionless. If on a fence, they simply squat wherever they may be at the time, and trust to remaining unnoticed. If on the ground and not too far from their burrows, which is not often the case, they will dart to their nests with an incredible celerity, going, we believe, the whole length of their passage-way to the nest, turning about, and retracing their steps to the entrance, from which they will peer out, and, when the danger is over, reappear and recommence their sports. These little animals play merely for play's sake, and have no more important object in view than amusement. Indeed, so far as we have studied animal life, this indulgence in play, just as children play, and for the same reasons, is common to all animals. We have often seen most animated movements on the part of fishes that could be referred only to play.

That some work was accomplished during July by our eight chip-mucks, we have no doubt, as early in August we dug out a nest beneath an oak, on the hill-side, and we found, besides the nest proper, two nest-like cavities, and in one of which—that most distant from the nest—was about a quart of yellow corn (maize). We judge, therefore, that these "magazines" were dug out by the chip-mucks late in the summer, and similar ones, no doubt, were excavated by the chip-mucks in the stone wall. What they did with the dirt we cannot guess. Certainly not a particle of it could be found about their nests' entrances.

About August 15th they commenced to work in real earnest. Instead of playful, careless creatures, that lived from hand to mouth, they became very sober and busy indeed. Instead of keeping comparatively near home, they wandered to quite a distance, for them, and filling both cheek-pouches full of corn, cinque pins (dwarf chestnuts), and small acorns, home they would hurry, looking, in the face, like children with the mumps. This storing away of food was continued until the first heavy white frosts, when the chip-mucks, as a member of Congress once said, went "into a state of retiracy."

The food gathered, we believe, is consumed in part, on their going into winter quarters, they spending some time in their retreats before commencing their hybernating sleep. This belief, on our part, is based on the result of digging out a third nest on the 3rd of November. The last time we noted down seeing a chip-muck belonging to a certain nest was October 22nd. Twelve days after we very carefully closed the three passages that led to the nest, and dug down. We found four chip-mucks very cozily fixed for winter, in a roomy nest, and all of them thoroughly wide awake. Their store of provisions was wholly chestnuts and acorns, and the shells of these nuts were all pushed into one of the passages, so that there should be no litter mingled with the soft hay that lined the nest. How long this underground life lasts, before hybernation really commences, it is difficult to determine; but as this torpid state does not continue until their food-supply is again obtainable out of doors, the chip-mucks, no doubt, store away sufficient for their needs throughout the early spring, and perhaps until berries are ripe.

So much for the present year, now nearly passed away; but we are not done with the chip-mucks yet, and next year, if all goes well, we purpose to follow the wanderings of the young brood of the past summer, for, we suppose, the old couple will not want them again after spring once fairly comes again this way.

CYPRIPEDIUM CALCEOLUS AND OTHER PLANTS IN EAST DURHAM.

THE excursion after "Rare plants at Castle Eden," described by James Percival (p. 18) last month, appears to call for supplement of a kind, if not for some correction.

No date (a thing always desirable) is given; but *if* the trip was made in either 1873 or 1874, it will interest readers of SCIENCE GOSSIP, even though it mortify Mr. Percival, to learn that the rare and beautiful Ladies' Slipper orchid was at the time of his visit existing and flowering in one or other of two denes, not so strictly preserved as to make invasion inexpedient, within a very few miles of the famous one it was vainly attempted to explore.

In Castle Eden dene it might have been found, too, but there more as a propagated or nursed plant than as a true wilding; for the owner, who truly most jealously guards his ravine, especially against itinerant and inquisitive plant-hunters, is locally reported to take artificial measures to insure its persistence: and rightly enough, from one point of view; for since the Ladies' Slipper partakes in a marked degree of the erratic idiosyncrasy of the family, if the wooded gorge where it once appeared spontaneously were left to itself, its shade to deepen, and its brushwood to thicken, it would soon cease to appear above ground, or only at long and uncertain intervals.

In the Report of the "Botanical Locality Record Club," just issued, I have given some account of this appearance of *Cypripedium* in two denes of East Durham, under differing yet both instructive circumstances: this, as being of general interest, I may perhaps be allowed to quote here. The names of the denes, and the exact localities in them, are for obvious reasons suppressed; my authorities are, however, unimpeachable, and in neither case is the dene that of Castle Eden.

"In 1873 this rare plant was discovered, by the clergyman of the parish, in some plenty in one of the many rocky, well-wooded magnesian limestone denes of Durham. As I myself saw in 1872, trees and underwood were being extensively cut down; and this fact furnishes the reason of its sudden appearance. Like *Epipactis*, it seems to lie dormant in shade, and only springs up when the sun gets to the ground, and I feel satisfied that it is really native.

"Quite independent of the above discovery, this year (1874) *Cypripedium* was also gathered in *another* Durham dene, some miles further to the north, by Mr. John Cameron; and upon his second visit to the spot, with Mr. E. C. Robson, 'seventeen plants were observed, not together, but distributed, occasionally however in clumps of six or eight.' This second locality was 'a truly wild and out-of-the-way spot . . . . . in a ravine, thickly wooded and steep on the southern side, but less abrupt on the northern side, infested with game: the rabbits had nibbled several of the plants.' In this case, however, the brushwood had not been cut; but it was 'noticed that it seemed to grow only on spots where *a slip of the land* occurred, or rather the sliding down of soil from the steep banks,' which circumstance no doubt resulted similarly in sunlight reaching the slopes of soil overturned and left bare."

With regard to the specific details of Mr. Percival's communication, I would ask indulgence for a few further remarks. It is generally desirable that any plants, or group of plants, recorded as observed during an excursion, should have assigned to them the district (if not the exact locality) they adorned; especially if that district differs from the one named at the beginning and end of the enumeration. For want of this, one not conversant with the county written upon, or little learned in topographical botany, might gather the impression that all the species mentioned marked the Castle Eden, or at any rate the East Durham district; for it is nowhere said, nor is any clue given, that such is not the fact. Although not so stated, the various plants named must have been found in three distinct regions, the eastern and western as much as sixty miles apart, and each differing widely from the others in physical characteristics and altitude, and therefore also in their *flora*. The species peculiarly abundant on the sandhills by the sea are rightly stated; but the *Crepis taraxacifolia* and *Lepidium latifolium* (? was it not *Draba*, which forms a striking feature of the spot) are introduced species near Hartlepool, and were probably picked off the weedy flats of *débris* formed of ballast, lying parallel to the sea, north of Hartlepool. *Astragalus hypoglottis* grows plentifully upon the ballast, too, but its indigenous habitats are the turfy magnesian-limestone cliff-slopes near the sea, where also the *Orchis ustulata*, the Privet and the Juniper, flourish as natives. The *Asplenium marinum*, affecting sheltered crevices of the sea-worn rocks, is scarce now, growing only at Marsden and Blackhall rocks, and there diminutive in size and infertile, but luckily, for the most part, out of reach of all but good climbers. *Woodsia ilvensis* has never been known save in one station—the Falcon's Clints,—a basaltic scar, almost on the Westmoreland border, and is now probably quite extinct. One single plant was seen and secured some five years ago by a miner at Middleton-Teesdale, and this is the latest occurrence I know of. *Rubus chamæmorus* grows only on the sub-alpine moory plateaus of the western peaks, common enough amongst the ling in places, but never found at a lower elevation than 1,200 feet. The *Meum athamanticum* mentioned as "seen in abundance" by Mr. Percival, was possibly some other species: *Meum* has never hitherto been observed in the county; so, if really correct, it is an interesting discovery, and the locality (after verification of the species by competent authority) should be placed on record. *Geranium pratense* and *sylvaticum* occur together by riversides, and in pastures in the hill dales, but the former descends to lower levels, and adorns many waysides in the central limestone districts of Durham. *Gentiana verna*, *Tofieldia*, and *Potentilla fruticosa* are confined to the higher parts of Teesdale, with *Polygonum viviparum* (misprinted *virginianum* in the paper) in the hilly pastures. *Helleborus viridis*, the "dead flowers" of which it is said were seen, is not an indigenous species in Durham—only a naturalized one, and rare as that even, occurring only in one spot by the Wear, and one or two by the lower reaches of the Tees.

Mr. Percival will, I trust, forgive these few animadversions upon his remarks, made, as I make them, solely with a view to remove possible misconception. My warrant must be that imperfect statement leads to hazy ideas, and that even gossip upon matters of science, if not definite in form within the limit of its subject, is of little value to anybody, if not entirely worthless.

F. Arnold Lees, F.L.S.
Middleton Hall, Upper Teesdale.

MICROSCOPY.

A Simple Method of Removing Air-bubbles from Sections.—I have been closely engaged for some time in the investigation of fresh mucous tissue, especially in embryonic structures, and as I invariably use the freezing process for cutting my sections, I have been much troubled by the presence of innumerable air-bubbles, which have resisted all manipulation, and even the use of the air-pump. The origin of the air-bubbles is, that in freezing water expels some of its free air, and this, involved in mucous tissue, presents such a fineness of division as to defy mechanical treatment. I looked, of course, for a solvent, and found it readily in cold distilled water which had recently been boiled. Boiling deprives water entirely of its air in solution, but on cooling the water takes it up again with great avidity. I place my section, as soon as it is cut, on a slide, and then allow a very gentle stream of the prepared water to flow over it for a few minutes; or, if the section will stand rougher handling, I place it in a bath of the water. In this way every trace of air-bubbles disappears. The process is so simple that it may be applied to the most delicate structures without injury.—*Lawson Tait, F.R.C.S., Birmingham.*

Atlas of the Diatomaceæ, by Adolph Schmidt.—We have had the opportunity of seeing the first part of this work, which promises to be, when complete, one of the most magnificent monographs ever published. The author, who is well known in Germany, has secured the assistance of the following gentlemen:—Messrs. Grunow, Gründler, Weissflog, Janisch, Pfitzer, and Eulenstein. The first part contains 26 figures of various species of *Actinoptychus*, 71 of *Naviculæ*, and 24 of *Surirellæ*. The plan adopted by the author is to make an enlarged drawing of the object (according to the prospectus, about 900 diameters), from which photographic negatives are taken, and from them permanent copies are made by the autotype or some analogous process (Lichtdrück). The price will be 6 marks (= 6 shillings) to subscribers whose names are entered before a stated period; after that the price will be advanced to 9 marks. A part will be published every two months. The size of the plates is 14 by $9\frac{1}{2}$ inches (German). The only work on the Diatomaceæ with which it can be compared is "Ehrenberg's Microgeologie," but which is far inferior to it in the beauty and accuracy of the figures. Herr Schmidt states that he has prepared 9,000 figures drawn to the scale of 900 diameters, from which selections will be made for the atlas, preferably of those genera which require careful illustration; at the same time new forms will be introduced, and where possible placed in juxtaposition with those species to which they bear the greatest affinity.*—*F. K.*

Researches in the Life History of Monads.—We wish particularly to call the attention of those of our readers who are interested in these minute forms, to a paper bearing the above title, and read before the Royal Microscopical Society.† The authors, Messrs. Dallinger and Drysdale, after a reference to their previous papers on this subject, proceed to describe how the forms investigated were obtained; viz., by the maceration of the heads of cod-fish and salmon for several months. A circumstance of considerable interest occurred in connection with these experiments. The authors say, "We always work from a small quantity of the large vessel of decaying matter which we keep at hand. During the early summer the intense and continued heat evaporated all the fluid from the salmon's head infusion without our knowledge. The form we were working had been in great profusion. It was growing less abundant in our small washing-tanks, and we feared we must wait another year to finish our inquiry. But we led a forlorn hope, and took the hard, porous, dried papier-mâché-like mass which formed the dried residuum of the infusion, and determined to put it in an exhausted maceration of the same kind, which at that time showed only very feeble signs of *any* life, and certainly no monads. We watched the result, and to our great surprise in three days the required monad appeared in remarkable vigour, and daily increasing abundance, enabling us to complete our researches into its cycle of development." In addition to this, another and remarkable form made its appearance, whose history the authors were enabled to complete, and which had very feebly shown itself previous to the drying up of the infusion, but now showed great vigour, and eventually survived and predominated, evidently very much at the expense of other forms. This new form possessed more distinctive and distinguishable structure than any other so low in the scale of life with which the authors were acquainted. This form they thus describe:—"The sarcode is invested with a distinct hyaline envelope perfectly structureless to our best appliances, and sharply distinguished from the protoplasm of the body; two flagella, inserted into what appears like a special organ of locomotion; a large central disc or nucleus-like body; numerous protoplasmic granules; a pair of "snapping" eye-spots, and occasionally some remarkable club-like appendages to the anterior of the body, the nature of which we have failed to ascertain." The shape of these remarkable organisms appears to be oval, and the size (exclusive of the flagella) when magnified 1,300 diameters, is 1½ inch the long diameter, and 1 inch the short diameter; the flagella are about twice the length of the body. By continuous observation on the normal form, with a power of 1,200 to 10,000 diameters, they were able to trace the cycle of change. In about 40 minutes a line across the short diameter appeared, and soon after a marked constriction within the hyaline membrane might be detected, the motion of the monad the whole while remaining unaffected. In abont two hours from the first a total division takes place, the hyaline membrane still remaining intact. After swimming freely for not less than 10 minutes, an indentation may be observed in the long axes of the divided bodies; and in from 7 to 20 minutes a constriction longwise ensues. After this the divided bodies remain within the hyaline envelope, sometimes dividing into 8 and even into 16, and swimming about with an elegance and ease not surpassed by *Volvox globator*. After swimming in this way for from 10 to 100 minutes, one of the forms escapes, and becomes a perfect monad like its parent. This method of increase goes on with great rapidity, and for many generations. For a detailed description of other modes of increase, we must refer our readers to the lucid and minute descriptions of the authors; and we think that the unprejudiced reader will come to the conclusion that these experiments are fatal to the theory of spontaneous generation. We find that germs are so minute that the highest powers of the microscope are unable to detect anything but a filmy cloud, and that only after some hours' patient observation can the first rudiments of an organism be detected. The authors have also proved that ordinary desiccation, or even heating up to 250° Fahrenheit, does not destroy their vitality.

Mounting Selected Diatoms.—I have at various times received from my friend Herr Weissflog, slides of selected diatoms (not arranged in patterns, the doing of which is a shameful waste of time), mounted in a manner which leaves nothing to be desired. The forms are mounted on a thin cover, ⅝ of an inch in diameter; a thin silver disc of similar size, with a central perforation, sometimes as small as the $\frac{1}{30}$ of an inch in diameter, is then mounted on the slide, and the glass cover placed upon it, and pressed down, the central aperture of the disc forming a tiny cell for the diatoms. Two advantages arise from this method of mounting; viz., the ease with which an object is found, and the cutting off a considerable amount of extraneous light. A further recommendation is the very neat appearance of the slides.—*F. K.*

* Subscribers' names will be received by the publisher of this Journal.

† Published in No. 72 of the *Monthly Microscopical Journal.*

CABINETS.—After a good deal of experience in various long journeys and voyages to and from India, I may be allowed to state the result upon slides of the two forms of cabinets in general use. I have found the old-fashioned *rack* cabinets much the more secure; in one that I have, my slides travel almost, if not entirely, uninjured, and that without any trouble; while those which I have in a much more expensive and admirably-made cabinet, in which the slides lie flat, much more convenient as it is for stationary use, no care in packing effectually prevents their sliding confusedly the one over the other, and in every journey I find some slides perish.—*I. G. Halliday.*

THE MICROGRAPHIC DICTIONARY.—We have received the concluding parts of this important work, and are pleased to announce to our readers the completion of this, the third and best edition. This is a book that no microscopist can afford to be without, and we regard it as a credit to English microscopy that a third edition should have been called for. The publisher is Van Voorst, 1, Paternoster-row.

ZOOLOGY.

BRITISH BIRDS.—Mr. Edward Bidwell has just compiled a capital list of birds met with in Great Britain. It is the most complete of any we have seen, great pains having been taken to verify every rare species. Those which may be called "Accidental Visitors," that is to say, such recorded species as usually live outside the region of which the British islands form only a part, are denoted in the list by an asterisk.

NATURAL HISTORY, &c., SOCIETY AT WATFORD.—It is always with great pleasure we record the foundation of any fresh centre for the united study of Natural History, and therefore we are glad to learn that it is intended to form a society, having for its object the investigation of the Meteorology, Geology, Botany, and Zoology (including Entomology, Ornithology, &c.) of the neighbourhood of Watford, and the dissemination amongst its members of information on Natural History and Microscopical science. The evening meetings of the society are to be held in the rooms of the Watford Public Library, and during the summer months field meetings will also be held. It is proposed that the annual subscription be ten shillings, without entrance-fee. The names of ladies and gentlemen willing to join the society will be received by Dr. Brett, Watford House; by Mr. Arthur Cottam, St. John's-road, Watford; and by Mr. John Hopkinson, jun., Holly Bank, Watford. It was hoped that a sufficient number of names will be shortly received to warrant a meeting being called to found the society at once.

RARE BIRDS.—Late in December, during the extremely cold weather, a pair of those very rare birds, the Little Bustard (*Otis tetrax*), were shot at Walton, in Suffolk. Both the birds were females.

REARING B. PERNYI.—I can recommend this species to those experimenting in silk-yielding larvæ, as an interesting and easy one to rear, though I find the larvæ do not thrive well on any tree except the oak. They do best in a moderately dry place, with plenty of air, and not too much direct sunshine. Some of mine, however, this season got "wet to the skin" when about a fortnight old, and recovered therefrom. It is not well to keep them in too close quarters, as "unpleasantness" sometimes arises between near relatives if the weather is warm. Properly, I believe the moths should not emerge from the cocoons until May; but the mild weather of late autumn will occasionally bring them out the same season. I have a female that has put in an appearance just now, though, as this is several days ago, and none others have followed, she may be doomed to die in "single blessedness," for I can hardly suppose she will live through the winter.—*J. R. S. C.*

PREVENTION OF HYDROPHOBIA.—As this disease, or at least alarm in respect to it, is on the increase at present, any suggestions with reference to it may be of value. On the supposition that the virus, or poisonous quality of the saliva, is of an acid nature, might not the application of an alkali easily diffusible, such as ammonia, be likely to be of service? Recent observations as to the value of camphor as a prophylactic, suggest that a spirituous solution of that drug applied to the wound might kill the germs of the disease. There appears a strong probability that mental influences have something to do in developing or nursing the disease, or in setting up a pseudo-malady, which is as fatal. Hence the too frequent discussion of the subject by the press is to be deprecated.

BOTANY.

CENTAUREA CALCITRAPA.—It appears to me that the specimen alluded to in SCIENCE-GOSSIP of the 1st of December by your correspondent from Brompton, and named as above by him, is more likely to be *Centaurea solstitialis*, a plant hardly to be considered indigenous, having been introduced with lucern. I am not aware of there being any yellow variety of *C. calcitrapa*. But Dr. Hooker mentions *C. solstitialis* as having yellow flowers, with the marked distinguishing feature in its specific character of having *pappus* soft, white, and copious; whereas *C. calcitrapa* is devoid of seed-down.—*J. H. Knox, Belfast.*

Alpine Botany.—Mr. Howse, in the January number of Science-Gossip, after giving the benefit of his experience as to the best mode of drying and preserving plants, asks that he may be favoured with that of others; and though I will not presume to say I can improve upon his plan, I will state what I have found the most effective mode, after having botanized in the Alps, Apennines, Pyrenees, the South of France, Switzerland, Italy, Sicily, Malta, Gibraltar, Algiers, &c., for upwards of twenty years. I may here state that the preservation of my plants, both in freshness and colour, has been such as to induce English botanists to suppose that the climate of the countries where they were gathered must have assisted in their preservation. I quite agree with Mr. Howse that plants should be well, not lightly pressed from the first; I have always pressed them between boards strong enough to bear the strain of stout straps, with great pressure, the boards being sufficiently pliant to allow of a very slight curve at the edges, where the bundle of plants is not so thick as in the centre: I have found willow boards to answer best. I place the plants first in the *commonest*, *thinnest*, *unglazed* silver or tissue-paper, the coarser the better, as being more transparent, so that the plant may be seen through it without being disturbed or removed, till it is dried and capable of retaining its form. I put three or four *separate* sheets of *absorbing* paper between each plant, drying each paper separately every day, for two or three days, or as long as may be found necessary, keeping the whole strapped as tight as possible; at first, indeed, I put them between strong boards of a portable press of my own invention, calculated to give the greatest pressure by means of two square-thread thin iron screws, 18 in. long, screwed into sockets, so that the press may be readily taken to pieces and go in a small space for travelling. Of course a press is hardly suitable for a person whose time is so limited as to cause him to be constantly on the move. There are many plants which should be killed before they are pressed; Orchids, for instance, will turn black, both leaves and stalk, as well as the flowers, unless the plant, leaves, and all but the flower-head, is immersed in *boiling* water for two or three minutes, so as effectually to *kill* it: the root or bulb at the same time may be punctured. The *flaccid* leaves should be then carefully laid out in their natural form on the silver paper with a small thin ivory paper-knife; thus the colours may be preserved. The same process should be adopted with bulbs of various plants, and the interior of the bulbs may be removed, so as not to disturb the outer coating. Some of the Crassulaceæ also, such as Sedums, Sempervivums, &c., should be effectually killed in like manner, otherwise they will sometimes actually continue growing, even under strong pressure. There are many flowers of which it is impossible to preserve the colour, particularly the blue colours, though some blues—the Gentians for instance—will keep their colour. Various modes have been adopted for drying plants expeditiously, such as placing them in an oven, or passing a hot flat-iron over them, &c. Mr. Planchon, professor of botany at Montpellier, who was for several years in the Herbarium at Kew, pressed them between wire frames, leaving a distance between each layer, so as to allow of rapid evaporation; but I have observed that such modes of drying, though a saving of time and trouble, have the effect of rendering the plants, especially the leaves, brittle, so as to break on being disturbed. I believe the only safe mode is to allow them to dry gradually, though at some cost of time and trouble. I feel satisfied that if otherwise dried my plants would not, after ten or twenty years, look almost as fresh as when first pressed. I always keep them in a dry place, entirely excluded from air; after any number of years I never find any insects, which a damp atmosphere with exposure to air is sure to produce. Another precaution I consider necessary, which is to *wash the roots clean*, as they frequently contain the eggs of insects, which, in their subsequent stages, even under pressure, are so destructive. The specimens, when finally dried, should be put upon white paper to set them off to the greatest advantage. The paper I have always used for drying is what the chemists constantly use abroad for filtering (papier à filtrer); it it more absorbent and thicker that our blotting-paper and *without any glazing*, quite porous. The commonest tissue-paper used by the grocers in France for packing candles is the thinnest and best for putting the plants in, on account of its transparency; the English tissue-paper is thicker and often slightly glazed.—*T. B. W.*, *Brighton.*

Botanical Locality Record Club. — This club has just issued its first report, the recorder being Mr. F. Arnold Lees, F.L.S. The report publishes the regulations of the club, and we are able to state, for the benefit of those who are jealous over the safe-keeping of our botanical rarities, that every precaution is taken to protect them. The doubtful species have been verified or eliminated, and henceforth we shall have none of that haziness respecting the local occurrence of rare species that has been caused through one compiler of a flora borrowing from another. A good deal of curious botanical information concerning rare plants is contained in this report, and we congratulate those who founded the club on their first success.

Synopsis of British Mosses. — The best synopsis of British mosses with which we are acquainted has recently been published by Mr. C. P. Hobkirk, the president of the Huddersfield Naturalists' Society: (London: L. Reeve & Co.). The description of each species is clear, technical, and full, whilst the list of varieties is great and equally veraciously described. No earnest student of muscology should be without this attractively got-up little volume. The localities and physical condition of growth are appended to each specific description. The work is based on Wilson's "Bryologia Britannica," and Schimper's "Synopsis," and does its author great credit. Mr. Hobkirk announces a "Geographical Distribution of the British Mosses," and requests collectors to forward him as complete lists of their several districts as they can, as well as the ranges and habits of the species.

Plant Eccentricities in Northamptonshire.—The erratic occurrence of plants has often been discussed in Science-Gossip, and it is somewhat hesitatingly I again venture to open the subject. *Sisymbrium Sophia* in 1874 was not uncommon in Northamptonshire. I observed it in some twenty localities between Weedon and Thrapstone (the Nene Valley), places thirty-four miles apart, and from Harleston to Towcester, thirteen miles apart, in some dozen places; in 1873 I did not see a single plant. *Chenopodium hybridum* in 1873 was growing plentifully by river-sides and waste places; in 1874 but one specimen was found. *Bidens tripartita* was very common by river, brook, and canal sides in 1873; in 1874 it had entirely given place to *Bidens cernua*, not a specimen of which could I find in 1873. Are these two really distinct species, or but well-marked varieties? Can *cernua* be the biennial variety? In contradistinction to the above may be mentioned *Geranium rotundifolium*, which still grows in the habitat near Brampton, mentioned in Sowerby's first edition over sixty years ago, but *Eryngium campestre* has disappeared from its Brockhall site, though it has been noticed there later than published records give. Any one passing through the east and south of our county would miss the Hartstongue Fern, yet let him open the lid of one of the old-fashioned village wells, and he would almost certainly be rewarded by seeing some luxuriant fronds of the Scolopendrium growing therein. The Vervain (*Verbena officinalis*) and Henbane (*Hyoscyamus niger*), common plants round Northampton, I am told, twenty years ago, have now almost entirely disappeared. *Lepidium draba* has for the last three years been growing freely on waste ground near the Nene side, but improvements have this year, I am afraid, disestablished it. Orchids are notoriously uncertain in their occurrence, but in 1874 I visited a locality for the Bee Orchis (which I discovered some twelve years ago, when a very young boy entomologizing) and found it still sparingly growing there.—*C. G. Druce, Northampton.*

"It is an astonishing fact that self-fertilization should not have been an habitual occurrence. Nature tells us, in the most emphatic manner, that she abhors perpetual self-fertilization."—*Darwin.*

GEOLOGY.

Graptolites of the Arenig and Llandeilo Rocks of St. David's.—A paper on the above subject has been read before the Geological Society, by John Hopkinson, Esq., F.G.S., and Charles Lapworth, Esq., F.G.S. Commencing with a brief historical account of the discovery of Graptolites in the neighbourhood of St. David's, from their first discovery in the Llandeilo series in 1841, the authors proceeded to explain their views on the classification of the Graptolites (*Graptolithina*, Bronn), which they place under the order *Hydroida*, dividing them into two groups, *Rhabdophora* (Allman), comprising the true siculate or virgulate Graptolites, which they consider to have been free organisms, and *Cladophora* (Hopkinson), comprising the dendroid Graptolites and their allies, which were almost certainly fixed, and are most nearly allied to the recent *Thecaphora.* The distribution of the genera and species in the Arenig and Llandeilo rocks of St. David's was then treated of, and the different assemblages of species in each of these subdivisions were compared with those of other areas. The Arenig rocks are seen to contain a number of species which ally them more closely to the Quebec group of Canada than to any other series of rocks, all their subdivisions containing Quebec species, while the Skiddaw Slates, which before the discovery of Graptolites in the Lower Arenig rocks of Ramsey Island in 1872 were considered to be our oldest Graptolite-bearing rocks, can only be correlated with the Middle and Upper Arenigs of St. David's. The Graptolites of the Arenig rocks of Shropshire and of more distant localities were also compared with those of St. David's. In the Llandeilo series of this district the *Cladophora* have now for the first time been found, a few species, with several species of *Rhabdophora*, occurring at Abereiddy Bay, in the Lower Llandeilo, which alone has been carefully worked, there being much more to be done in the Middle and Upper Llandeilo, from which very few species of Graptolites have as yet been obtained. The paper concluded with descriptions of all the species of Graptolites collected in the Arenig and Llandeilo rocks of St. David's within the last few years, of which sufficiently perfect specimens have been obtained, doubtful species being referred to in an appendix. Forty-two species were described, belonging to the following genera:—Didymograptus, Tetragraptus, Clemagraptus (gen. nov.), Dicellograptus, Climacograptus, Diplograptus, Phyllograptus, Glossograptus, and Trigonograptus (*Rhabdophora*); Ptilograptus, Dendrograptus, Callograptus, and Dictyograptus (*Cladophora*).

The Former Existence of an Indo-Oceanic Continent.—A valuable paper on this subject has also been read before the London Geological Society, by H. F. Blandford, Esq., F.G.S., in which the author showed that the plant-bearing series of India ranges from early Permian to the latest Jurassic times, indicating that, with few and local exceptions, land and freshwater conditions had prevailed uninterruptedly over its area during this long lapse of time, and perhaps even from an earlier period. In the early Permian there is evidence in the shape of boulder-beds and breccias underlying the lowest beds of the Talchir group, of a prevalence of cold climate down to low latitudes in India, and as the observations of geologists in South Africa and Australia would seem to show in both hemispheres simultaneously. With the decrease of cold the author believed the Flora and Reptilian Fauna of Permian times were diffused to Africa, India, and perhaps Australia; or the Flora may have existed somewhat earlier in Australia, and have been diffused thence. The evidence he thought showed that during the Permian epoch, India, South Africa, and Australia were connected by an Indo-oceanic continent, and that the first two remained so connected, with at the utmost some short intervals, up to the end of the Miocene period. During the latter part of the time this continent was also connected with Malayana. The position of the connecting land was said to be indicated by the range of coral reefs and banks that now exists between the Arabian Sea and West Africa. Up to the end of the Nummulitic epoch, except perhaps for short periods, no direct connection existed between India and Western Asia.

Carboniferous Fishes.—At a recent meeting of the Manchester Geological Society, Mr. John Aitken, F.G.S., exhibited a number of interesting fossils, principally from the Coal Measures of Lancashire, and read the following brief description of them:—"Nos. 1 and 2 are two specimens of a new and undescribed ganoid fish of the genus *Pygopterus*, which I recently discovered in a slab of shale from over the Arley Mine of coal at Copy Coal-pit, in the Cliviger valley, near Burnley. The slabs exhibit the fish laid on its side, with the exception of the head, which presents the upper surface to view. Both sides of the fish are exhibited, showing the form of the head, tail, and fins with marked distinctness. The head is long and comparatively narrow, and ornamented by the presence of well-marked, long, waving ridges, which traverse it throughout its entire length. The scales are about one-eighth of an inch in length across their longest axis, rhomboidal in shape, and highly sculptured, having about six or eight distinct waving ridges aud furrows crossiug them in a line almost parallel with their sides, and in a line with the body of the fish. The tail and fius are also well shown, the former being well defined, and very large in proportion to the size of the fish, measuring across from point to point two inches and a half, whilst the total length of the specimen reaches only five inches and a half, and the breadth of the body at its widest part one inch. The head is bent round so as to bring the snout to within about three-quarters of an inch from the lower lobe of the tail. No. 3 is a tooth of *Rhizodus Hibberti*, Agg., from the Blackband Ironstone, Denhead, Fifeshire, situated low down in the Carboniferous Limestone series of Scotland. Teeth of this genus have not as yet been found in the true Coal Measures of England, and it is a moot point with ichthyologists whether their origin should be referred to fish, or to some animal of the Labyrinthodont or some other closely allied order. The specimen exhibited is in a good state of preservation but small, beiug only two inches in length, whilst some teeth of this character are known to reach fully six inches or more in length. No. 4 is a rare palatal tooth named *Psephodus magnus*, from the Arley Mine of the Middle Coal Measures, Burnley. Its form is that of a truncated or obtuse cone, having both ends rounded, $\frac{11}{16}$ of an inch in length, and $\frac{9}{16}$ of an inch wide at its broadest part, and a quarter of an inch at its narrowest end. It is semi-cylindrical in shape, haviug its upper surface rounded in a line with its greatest length, the entire surface being covered with a profusion of very fine punctations. This tooth is exceedingly rare in the coal Measures, but is said to be a moderately common form in the Carboniferous Limestone of Armagh, in Irelaud. Nos. 5 and 6 are two fiue examples of *Petalodus*, obtained from the Upper Foot Coal of the Lower Coal Measures, Oldham. These teeth are the only two of this genus derived from the Coal Measures which have come under my observation, if indeed they are not the only ones yet found, although they are by no means rare in the Carboniferous Limestones of Ireland and Yorkshire. Lord Enniskillen has remarked that he had never previously met with teeth of this genus from the Coal Measures. The specimens measure one inch across the widest part, three-quarters of an inch in length, and half an inch across the base; they are convex on one side and flat on the other, and one of them shows traces of rather indistinct punctations on the upper or convex surface. Nos. 7 and 8 are also two palatal teeth from the Lower Coal Measures of Oldham. No. 7 is doubtfully referred to the genus *Helodus*, its shape, however, is not that usually characterizing teeth of this class. No. 8 is an undetermined palatal tooth of so unusual a form that I have not ventured to offer an opinion as to the genus to which it should be referred. Nos. 9 and 10 are two palatal teeth from the same locality and horizon as Nos. 5 and 6, described above, probably belonging to the genus *Helodus*, the form of which, however, is so different from that usually assumed by teeth of this genus as to render their determination somewhat doubtful."

NOTES AND QUERIES.

Are Elvers Young Eels?—As Science-Gossip is not merely a monthly medinm for the interchange of naturalists' gossip, but is also valuable as a book of reference, I think last year's volume should not have closed without a more satisfactory answer to the above question than that of your correspondent in the August number. In the case quoted by him, the Severn Fishery Board failed to prove their point, bnt in a case afterwards tried the Board obtained a conviction on evidence given by Mr. Frank Buckland, the magistrates considering that he "conclusively established the fact that elvers are the fry of eels." In describing the points of resemblance between elvers and full-grown eels, Mr. Buckland showed the similarity of construction apparent in their heads, "the lower jaw fitted in above the upper so as to make a sort of close-fitting little box, and the eye was exactly over the level of the junction of the upper and the lower jaws, the teeth were set in a very peculiar way upon the roof of the upper jaw and upon the edge of the lower jaw"; in their fins,—"the fin began in about the centre of the body, and then expanded itself into a beautifnl fringe till it arrived at the tail, where it further expanded into a flat and very delicate substance"; in their gills, "covered up by a most delicate cnrtain, which acted as a valve, and as a reservoir for water; thus enabling the fish . . . to keep his gills moist during the time he is out of water"; and, lastly, in their caudal hearts, for a "heart existed in the tail of no other fish except the tadpole." A fnll report of this second prosecution appeared in the *Standard* of May 25th or 26th.—*W. R. H.*

Natural History Societies, &c., in Shoreditch.—I am moving to a cnracy in Shoreditch, and shall live between Paul-street and Curtain-road. I shall be glad if any of your readers can help me in three points. 1. Is there any good general Natural History or Scientific Society in the East or North-east of London? My specialties are Geology, Botany, and Zoology. 2. What plants or creepers wonld exist in Shoreditch in the open air? 3. What could be cultivated in a greenhouse formed by connecting two stacks of chimneys on the top of some model lodging-houses?—*Rev. T. W. Horsley, Witney, Oxon.*

Swallows and Starlings.—Generally speaking, the swallows leave West Cramlington at the end of September, although on the first Snnday of October, during the middle of the day, the weather being fine, I noticed two skimming along the edge of a wood. Starlings are as homely with us dnring the winter as the rooks. It is very interesting, at the close of the day, to watch gronp after group making their way home, almost darkening the air as they fly over our heads. A starling was never known to stay with us during the winter season before.—*John Simms.*

Lizards, &c., renewing their Tails.—I have had several of the common viviparons lizards in my window fernery during the past summer. One of them, when captured, had lost its tail, apparently quite recently. The wound seemed to scar over, a dark scaly knob eventually appearing; this quickly became pointed, and continued to elongate, the curious thing being that the small end seemed to grow first. Before it had grown more than a third of its length, it died, poisoned, I think, by being fed with moths killed by the fumes of cyanide of potassinm. Since that, the largest specimen I had got out one day, and, when found, had managed to divest itself of about an inch of its tail. It is now growing in the same way, the small end first, and though it does not present such a strange appearance as the other did, the difference between one part of the tail and the other, on which it is growing, not being so apparent, still it has a cnrions look. A gold fish in an aquarium belonging to my father, some years ago, renewed a portion of its tail, that had been eaten by a hnngry stickleback.—*John E. Robson, Hartlepool.*

Lunar Rainbow.—On October 2nd, whilst walking between Woolston and Netley, I saw a perfect arc. The colours were brilliant, and the effect beautiful. On Saturday, the 3rd, there were frequent storms. Whilst sheltering from one of these, my attention was drawn to a perfect double arc, and a portion of a third being visible. It was, I suppose, the reflection of the outer one, as the colours were inverted, and it appeared to join the highest bow.—*B. W. Gothard.*

Mounting Zoophytes.—Can any reader of Science-Gossip kindly inform me of an easy method to mount in balsam zoophytes which have been dried and kept for some time? Davies, in his work on "Mounting," gives a method adopted by Mr. Goulding Bird, but it is both difficult and expensive. I think some one of the many readers of Science-Gossip who manipulate these beautiful microscopic objects, would be able to give a method easier than the one described in "Davies."—*J. S.*

Remarkable Growth of Trees in Tewin Churchyard.—Having on more than one occasion visited Tewin churchyard, intent on the study of the remarkable intergrowth of trees upon the grave of Lady Ann G——, I have been induced to come to a different conclusion to that of your correspondents to account for their presence, and their singular growth in such a position. Trees produced from seeds growing together, compressed between stones, as these have been, are naturally forced to unite and intermingle in infancy, which, increasing as the girth of bole or branch increases with age, exhibited eventually a strangely distorted and an unnatural incongruity of growth. As to the origin of the ash-tree seeds, is it not a fact that the remnants of the boles of old and fallen trees exist on the brow of the hill to northward, and which it is probable were of the ash-tree kind? Finally, I believe, either the Lady Ann became, for some reason—either to memory when dead, or previously, alienated from her family, and that following the erection of the tomb, no heed was taken of it, either in the matter of cleaning or painting. Were this so — no annual stipend being paid to the sexton for this purpose, and considering that sheep at all seasons are turned loose therein, and that no particular heed is given to any tombs, or graves, but snch as are wired over, &c. Does this not appear feasible?—*William Earley.*

Observations on the Common Stinkhorn (*Phallus impudicus*).—For some time past I have been interested in fungi, and have made colonred drawings of all the varieties I have been able to procure, bnt it was not till qnite lately that I first saw a specimen of the common stinkhorn (*Phallus impudicus*), and perhaps some observations which I made on it may not be uninteresting to your readers.

On the 25th of September last a very fine and perfect specimen of this fungus was brought to me by a gardener at Beckenham (Kent), where I was then residing. It was in three separate pieces; each piece was perfect in itself, as he had taken great pains not to injure it in removing it from the ground, where it was growing under some Scotch firs. First was the stem, with the pileus or cap, which latter was almost entirely covered with a slimy brown mucilage, resembling in substance the mire of a pig-stye, only that it was of a yellow-brown hue: from this slime was emitted the most horrible odour. I took it in my hands by the stem, which was nearly pure white, to look at it closer, but was obliged to hold it at arm's length, the smell was so fearful. Secondly there was the volva, or wrapper, out of which the stem had grown. It was like a hollow circular bag of a dirty brownish colour; and below this again was a nearly perfect round ball—a solid bulb of a roughish surface like a puff-ball. It was white, slightly tinged with brown, and had a few fine stringy rootlets attached to it. My friend the gardener, before leaving me, had assured me that the flies would come and eat up the filthy brown slime which covered the cap, and leave it a pure white. This seemed incredible, but I can now testify to the truth of the fact; for I had scarcely arranged the fungus against the greenhouse wall, than it was almost covered with large blue-bottle flies, eagerly devouring the stinking slime. I had not observed any near before; they were attracted, though previously invisible. I made my drawing as hastily as possible, for I could scarcely endure the smell, and returned to the house, leaving the flies to enjoy their feast, and they certainly made the most of it; for when I returned, in two hours and a half from the time when I had first put the fungus aside, they had entirely concluded their feast, and had disappeared, leaving exposed to view the honeycombed structure of the pileus, now quite devoid of slime, and the fetid odour much diminished, though still too strong to be pleasant. On the following day I made another drawing of the pileus with its deeply honeycombed surface. I cannot say that it was purely white in colour, as the gardener had foretold it would be; it was whitish, the upper edges of the cells being still brown.—*F. M. K.*

The Glastonbury Thorn.—I find at p. 758 in the second volume of "Chambers' Book of Days" the following:—"The Miraculous thorn-tree of Glastonbury Abbey, in Somersetshire, was stoutly believed in until very recent times." From which I infer that it is not now; and whereas in my mind it *is* a miraculous thorn-tree, in that it actually does, in accordance with the legend, flower twice a year, one of those times being at Christmas time; and thinking that perhaps some of the many readers of Mr. Chambers' valuable and interesting book may be misled by this article, I write these few lines. On the 20th of December last year [1873], I had brought me from Glastonbury, by a friend, a sprig of hawthorn covered with flower-buds, and also two young plants in full leaf. The flower-buds were not quite advanced enough to expand in water, but would certainly have opened in a few days had they been left on their parent stock, for they were perfectly formed. The two plants I placed in my garden at Woodside, near Croydon, and when I left England in April they were flourishing well and throwing out vigorous young shoots. "One of the first accounts of this thorn-three in print was given in Hearns's 'History and Antiquities of Glastonbury,' published in 1722. The narration consists of a short paper by Mr. Eyston, called 'A Little Monument to the once Famous Abbey and Borough of Glastonbury, with an account of the Miraculous Thorn, that blows still on Christmas-day, and the wonderful Walnut-tree, that annually used to blow on St. Barnaby's day.' I was told by the inn-keeper where I put up my horses, who rents a considerable part of the enclosure of the late dissolved abbey, that St. Joseph of Arimathea landed not far from the town, at a place where there was an oak planted in memory of his landing, called the 'Oak of Avalon'; that he (Joseph) and his companions marched thence to a hill, near a mile on the south side of the town, and there, being weary, rested themselves, which gave the hill the name of Weary-all-hill (locally abbreviated into Werrall); that St. Joseph stuck on the hill his staff, being a dry hawthorn stick, which grew, and constantly budded and blowed upon Christmas-day; but in the time of the civil wars, that thorn was grubbed up. However there were in the town and neighbourhood several trees raised from that thorn, which yearly budded and blowed upon Christmas-day, as the old root did." I shall feel much obliged to any of the readers of Science-Gossip who will tell me the reason for the above phenomenon, and if the tree, botanically speaking, differs from the common white thorn. The climate at Glastonbury is very mild, and frequently ferns and delicate annuals may be found quite late in the year with fresh green leaves.—*J. A. Fletcher, B.B.N.A., Montreal, Canada.*

Preservation of Marine Animals.—Being preparing to spend this year in collecting objects of natural history in every possible department, I should feel much indebted to any person who would kindly oblige me with his experience in the preservation of whatever objects he devotes himself to. I specially desire information regarding parasites of marine animals; on what, and what parts are they to be looked for; and how treated when found? Again, relative to mollusca and any other desiderata I meet. How would microscopists wish me to manage them when I could not let them have them living or fresh, as also the result of the fine-net dredge, which I intend for surface "skimming"? No doubt I shall have much to distribute for exchange, and shall be glad to oblige correspondents.—*T. McGann, Burrin, Oranmore, Ireland.*

Gooseberry Caterpillar.—Science-Gossip contains two plans for destroying these creatures; both are good. One is by "A. W.," in November, p. 262; the other by Mrs. Watney, in January, p. 23. There is, however, a trifling difference in them. Mrs. W. kills them *after* they have destroyed her fruit; "A. W." *before* they have touched it. Mrs. W. is widely astray in attributing them to the Magpie moth, instead of a small, dingy-yellow fly that lays its eggs on the under side of the young leaf.—*A. N.*

An Aged Cypress.—Perhaps the following may be of interest to some of your readers:—"The oldest tree on record is said to be the Cypress of Somma, in Lombardy. It is supposed to have been planted in the year of the birth of Christ, and on that account is looked upon with reverence by the inhabitants; but an ancient chronicle at Milan is said to prove that it was a tree in the time of Julius Cæsar, B.C. 42. It is 123 ft. high, and 23 ft. in circumference at one foot from the ground.

Napoleon, when laying down the plan for his great road over the Simplon, diverged from a straight line to avoid injuring this tree."—*G. O. Howell.*

Preserving Algæ.—In the last number of Science-Gossip, Mr. T. McGaun asks how to preserve marine algæ. The means I have found the most effectual are as follows:—The sea-weed is put into a shallow dish (such as used by photographers), which should be slightly inclined, to allow the water to run slowly away; the whole is then placed under a dripping tap of pure water, and left there till the whole of the salt is washed away. It is then allowed to drain on blotting-paper for a short time, when it is immersed in pure alcohol, where it remains till I am disposed to mount it. When this occurs, it is removed from the alcohol, drained as before, and soaked in chloroform, when it is ready for mounting in balsam, a medium I always use in preference to any other. The only disadvantage is that the object is rendered very transparent, besides destroying the colour; but this is easily overcome by staining. I generally use a warm solution of logwood, which is easily made, and gives a first-rate colour. I have some very good specimens treated in this way, and I may say that I have been very successful with what I have undertaken; among which are *Plocamium coccineum* in fruit, *Batrachospermum moniliforme*, *Callithamnion tetragonum*, all beautiful specimens. —*Thos. Palmer, F.R.M.S.*

Imitation of Animals.—Under this head I may mention an instance I have myself seen. A friend of mine has a young canary and a Java tom-tit. In some of his habits the tom-tit is peculiar; he will never leave his perch in the centre of his cage, but in order to feed swings himself backwards until his head is level with the seed-glass; thus he always feeds with his head downwards. The birds are hung side by side. The canary tries very hard to imitate the other's mode of dining, but generally upsets himself, but I believe he still continues trying it. He imitates the note of the tom-tit exactly, but canaries will generally do this.—*E. T. Evans.*

Hedgehogs Carnivorous.—In reply to your correspondent "F. C. S." I would state that one of my friends kept a hedgehog which was fed on cat's meat, whilst some other friends had one that ate scraps of meat, and was fond of picking chicken bones. I strongly suspect that beetles, though their reputed fare, do not form the staple of their food. When I was staying down in north-west Norfolk I found they were accused of poaching partridges' eggs, and lynched accordingly whenever caught; but I am not aware whether there is any positive proof of their crime in this latter case.—*B. B. Woodward.*

A Carnivorous Hedgehog.—In answer to inquiry by "F.C.S." in the last number of Science-Gossip;—it is a well-known fact that hedgehogs are carnivorous, and there is no lack of instances to support this statement. I may mention one or two cases on the authority of Mr. Timbs (*vide* "Eccentricities of Animal Creation"). "The voracity of the Hedgehog," he says, "is very great. A female, with a young one, was placed in a kitchen, having the run of the beetles at night, besides having always bread and milk within their reach. One day, however, the servants heard a mysterious crunching sound in the kitchen, and found, on examination, that nothing was left of the young hedgehog but the skin and prickles—the mother had devoured her little pig! A hedgehog has also been known to eat a couple of rabbits which had been confined with it, and killing others; it has likewise been known to kill hares." Again—"A hedgehog was placed in one hamper, a wood-pigeon in another, and two starlings in a third; the lid of each hamper was tied down with string, and the hampers were placed in a garden house, which was fastened in the evening. Next morning the strings to the hampers were found severed, the starlings and wood-pigeon dead and eaten, feathers alone remaining in their hampers, and the hedgehog alive in the wood-pigeon's hamper. As no other animal could have got into the garden-house, it was concluded that the hedgehog had killed and eaten the birds." The same author records their eating frogs, toads, and other reptiles and mice, and, in captivity, snakes. It would thus appear that the Hedgehog's appetite is not only carnivorous but almost omnivorous.—*W. Sharp.*

Feline Oddity.—I have noticed the phenomenon referred to by J. W. Horsley, once in a collie dog, and twice in a horse. In both latter cases one eye was greyish-white, and the other brown. I cannot vouch for the perfect eyesight of the horses, but can for that of the dog. I did not know, but once met a gentleman who had this peculiarity; his right eye was of a greenish or yellowish-grey, while the other was of a deep blue colour.—*W. Sharp.*

Feline Oddity.—In your January number, a correspondent asks whether any of your readers have ever observed a human being exhibiting the peculiarity of two differently coloured eyes. My gardener has all his life had two such eyes, one a rich brown, the other a greyish blue, and his sight has always been very good.—*W. H. Gwillim.*

How to put Aquaria right.—Will any of your correspondents, who have more experience than I in such matters, tell me what is the matter with my aquarium? It is a large bell glass, containing about ten or twelve gallons of water. Having been cracked, I have covered the bottom with Portland cement. In it are a few gold fish, a dace or two, a couple of carp, and two minnows, a few snails, and six mussels, a pot of wiry glass, and a root of valisneria. My trouble is, that the weed, shells, bottom and sides of the glass, are continually getting covered with a sort of hairy slime, of a whitish colour. The water gets thick, and the fish come to the top. Simply changing the water is of no use, as in an hour or so it is as bad as ever. Everything must come out, be thoroughly scrubbed and cleaned, and replaced, and then it will sometimes last three days without changing, but the slimy substance makes its reappearance in a few days. Several people have seen it, who have aquaria well organized and balanced. One said I must have mussels, but they do no good; another said snails, but with no effect; I am now told I have too many fish, so I took out two carp each about six inches long, leaving ten small fish, none over four inches, but the evil is still unabated. But I think I shall doubtless get some valuable information through the medium of your journal.—*W. H. C.*

Rare Birds.—A spoonbill (I am sorry to say) was lately killed in this county, as were a pair of hoopoes last year, that visited my grounds. If a fine were exacted from the shooters of every spoonbill, stork, hoopoe, roller, oriole, bee-eater, kingfisher, Cornish chough, some of those which are migratory would be induced to rest here more frequently, and the numbers of the constant residents increase.—*C. F.*

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.

ROBERT RENTON.—The leaf sent owes its marking to the mining habits of the caterpillar of a little moth, called *Nepticula*. See "Half-Hours in the Green Lanes," p. 187. They are not uncommon objects, and the markings are due to the green matter of the leaf having been eaten away between the skins.

J. SIMS.—Accept our best thanks for the admirable fossil sections sent as slides.

J. M. RAINE.—The double apple sent was one of the best examples of the kind we have seen. For an explanation of this and similar phenomena consult Dr. Masters' "Vegetable Teratology."

W. RUSSELL.—Gosse's "Evenings with the Microscope" (new edition) will prove a very useful and trustworthy book for you. By all means get it, if you have Lankester's "Half-Hours with the Microscope" (new edition), with chapter on the Polariscope, by Fred. Kitton.

J. KING.—Your fossils are: 1. Head of Trilobite (*Phillipsia*), a mountain limestone species; 2. *Euomphalus pentangulatus*; 3. *Spirifer glaber*; 4. *Goniatites sphæricus*; 5. *Producta punctata*; 6. A fossil coral, *Lithostrotion basaltiforme*. They are all carboniferous limestone fossils, and may be regarded as good characteristic forms.

MISS R.—You will find the best description concerning the collecting and preserving, as well as mounting of sea-weeds, in an article written by Mr. W. H. Grattann, in SCIENCE-GOSSIP for 1872. It will reappear in the handbook now preparing, called "Collecting and Preserving."

J. TURNER.—Thank you for the suggestion. We are always glad to receive any hints from intelligent subscribers that will assist us in making the magazine more useful and interesting. The subject will be taken up at no distant period.

H. J.—The lichens inclosed are as follows: 1. *Lecanora parella*; 2. *Physcia stellaris*; 3. and 4. *Physcia pulverulenta*; 6. *Parmelia olivacea*. No. 5 is not a lichen, but a "liverwort" (*Jungermannia*).—J. C.

A. F. M., AND OTHERS.—It is quite a common thing for the Brimstone, Tortoiseshell, Peacock, and other nearly allied butterflies to appear on bright days in winter, even though the previous days have been so extraordinarily cold. These butterflies only hybernate during the winter, and are soon restored by a few hours' warmth. It is a great mistake to suppose they have just emerged from the chrysalis at such times.

J. DUTTON.—The specimens inclosed in small phial appear to be the larvæ of Cyclops.

R. B. M. (Birmingham).—You can get all the back volumes of SCIENCE-GOSSIP, bound, by applying at the publisher's.

T. MILLS.—Get Hayward's "Botanist's Pocket-book," published by Bell & Daldy. It is the best and most portable of its kind we know of.

J. S. HARRISON AND OTHERS.—Answers next month.

MOSSES.—We received a packet of six mosses (named, with a query). Will the sender again forward his address?

J. EDWARDS (Banff).—The photograph of the bone certainly looks like the femur of the *Plesiosaurus*, but we should know better if you would send us the measurements. Also, if it is lenticular or round, as the photograph does not convey the idea.

CECIL SMITH.—Your specimen was much decomposed, but it appears to be the "Jew's Ear Hirneola" (*Hirneola Auricula-Judæ*). See Cooke's "Handbook of British Fungi," vol. ii. page 349.

W. JAMES.—The sentence is correct. No vertebrate animal has more than two pairs of limbs. Only the pectoral and anal fins in fishes correspond to the fore and hind limbs in other animals. The other fins are not considered limbs, nor are they the equivalents.

DR. C.—We fortunately came across the specimen of beetle sent some time ago. It is *Dromius linearis*, Ol., very common all over England.—E. C. R.

F. H. A.—The Hepatica seems to be *Marchantia polymorpha*.

R. R.—The lichens inclosed were:—1. *Evernaria furfuracea*; 2. *Parmelia physodes*, var. *labrosa*; 3. *Lecidea contigua* (state of).—J. C.

EXCHANGES.

WANTED, Good Injections; first-class mounted and unmounted Objects given in exchange.—Micro, 86, Week-street, Maidstone.

CORRESPONDENCE and Exchanges wanted in Birds' Eggs and Skins, and Marine Shells, with American and Colonial Collectors, by J. T. T. Reed, Ryhope, Sunderland.

FOR Packet of Foraminifera from west of Ireland, and section of Jawbone of Indian Deer, unmounted, send good Slide.—W. Tylar, 165, Well-street, Birmingham.

MOUNTED Micro-fungi, for mounted and named Diatoms; also Micro-material of all kinds required. Lists exchanged.—Dr. B. Lewis, Burry Port, South Wales.

CASSELL'S "Natural History," 4 vols. (unbound), and Jardin's "Naturalist's Library," 11 vols. (unbound), for other works on Natural History, particularly the Figuier Series.—Thos. H. Hedworth, Dunston, Gateshead.

SLIDES of Human Parasites, for other good Objects, mounted.—Thomas Buck, 111, Corporation-road, Middlesborough.

FLORA of West Cheshire, 200 species (Exogens), some rare, many officinal, beautifully mounted, for Books or small Microscope, &c.—Mr. Higginson, Newferry, Birkenhead.

WANTED, fresh specimens of Nostoc; rare Mosses or Lichens offered.—E. M. Holmes, 23, Mayton-street, Holloway, N.

SAMPLES of Prepared Material from the Carboniferous Limestone, containing Foraminifera, Polyzoa, Entomostraca, remains of Echinodermata, for really good Micro Slides, one sample per slide.—Apply, Rev. W. Howchin, Newgate-street, Morpeth.

MR. ALFRED BELL would be glad if any one living in the Fenlands or peat district could send him any samples of stuff containing Elytræ and other remains of Beetles or other insects; Fossils or recent Shells in exchange.—5, Grafton-street, Fitzroy-square, London.

RED and Coralline Crag Fossils, in excellent preservation, for Silurian Trilobites. Desiderata: Ogygia, Trinucleus, Asaphus, Calymene, Phacops, &c.—Address, T. E. J., care of Editor SCIENCE-GOSSIP, 192, Piccadilly, London.

A PHOTOGRAPHIC CAMERA STEREOSCOPIC, with Stand, Lerrebour Lens, Dark Slide, Chemicals, Glass Boxes, Trays, &c., for an equivalent; as a good ¼-in. Object Glass, works of Natural History, &c.—For particulars apply to R. Battersby, Esq., Carra Lake, Killarney.

WANTED, the Fry, Young, and Vars. of Anodons and Unios, for other Shells, Fluviatile or Marine.—Mr. Marshall, Fotley-villa, Fotley-road, North Brixton, London.

BOOKS, &c. RECEIVED.

Lubbock's "British Wild Flowers, in Relation to Insects." London: Macmillan.

"The Physics and Philosophy of the Senses." By R. S. Wylie. London: H. S. King & Co.

"The Garden Oracle." By Shirley Hibberd.

"Popular Science Review." January.

"Monthly Microscopical Journal."

"American Naturalist." December.

"The Colonies." December.

"Land and Water." December.

"Ben Brierley's Journal." December.

"Animal World." December.

"Report of the Botanical Society Record Club."

"Journal of Applied Science."

CORRESPONDENCE RECEIVED UP TO 12TH ULT. FROM:—J. J. C.—F. K.—L. T.—L. G. H.—A. W. L.—J. J. M.—T. B.—W. M.—H. B.—J. A. F.—C. F.—J. G. W.—J. S. H.—T. G. P. V.—J. F.—E. B.—T. B. B.—E. M. H.—A. B.—A. F. M.—J. H.—J. K.—J. T.—J. H. M.—E. T. E.—J. T. T. R.—W. H. W.—A. M.—J. W. G.—A. B.—A. M.—T. H. H.—E. A. L.—H. B. W.—Dr. B. L.—T. B. W.—H. J.—W. H. G.—M. M.—W. T.—W. S.—M. W.—T. McG.—A. N.—H. H.—T. P.—A. S.—E. F.—G. O. H.—F. H. A.—J. S.—W. L.—W. H.—C. S.—J. H.—T. E.—W. J.—Col. H., &c.

A FEW WORDS ABOUT BEES.

WHEN pious old Dr. Isaac Watts wrote the lines with which we are all familiar, he probably knew very little about these wonderful insects, or he would hardly have called the honeybee "little": it should have been the medium-sized bee. But he is not the only one who has sadly neglected them. Even amongst entomologists they are very much ignored for the more favoured Coleoptera and Lepidoptera. If they are more difficult to collect and preserve than those insects, they well repay the extra trouble, the instinct displayed by some, verging close upon reason, if it be not an inferior order of that power. In the hope that some of your readers may be induced to study them, I have written this short account; meagre indeed it is, since a whole number of this journal would not contain what might be said of one species alone, the Hive-bee. When I have shown my collection to friends, the general exclamation has been, "What, are those bees?" Nor is this at all surprising; if the reader, supposing he has never seen a collection of bees, or read one of our three published works upon them, will only run over in his mind the bees he can recollect to have seen. There will be the Yellow-barred bumble, the Red-tailed bumble, and perhaps the black one, the Leaf-cutter, the Mason-bee, and the Hive-bee, perhaps the Carder-bee, and possibly another or two. But few persons have any idea that we have in these islands about two hundred and twenty species, and that they vary in size from one and a half to about fourteen lines in length (I need hardly say a line is the twelfth part of an inch). Some are almost entirely destitute of pubescence, while others, as the Bumble-bees, are densely covered. The colour of their outer shell or case is generally a blackish brown, though sometimes quite a blue black; several are bronzy, while some are beautifully variegated with red, yellow, or white. Of course I am alluding to British species only.

It is exclusively the female and neuter that collect the honey and pollen for the subsistence of the future young. The males do nothing but make themselves as happy as the sunshine will allow them, though no doubt, in sporting about from flower to flower, they are unconsciously making themselves useful by assisting nature in the distribution of pollen. This is collected in various ways. Some of them carry it on the shank of the hinder leg, some on the whole leg, which is densely covered with long hairs for the purpose.

One large genus (*Andrena*) has a curled lock of hair at the base of the hind leg, beneath it; the back part of the thorax or middle portion of the body is generally more or less covered with longer or shorter pubescence, sometimes curled; and some (the Social Bumble and Hive bees) collect into a basket, as it is called, formed by an expanded joint of the hind leg (tibia), round which is placed a row of stiff setæ, curved slightly inwards, and standing at nearly right angles to the outer surface of the leg. The hind legs of all those constructive bees which gather pollen on the leg are considerably thickened. Another group collect on the belly, the plates of which are densely covered with stiff hairs for the purpose. The Leaf-cutters and Masons (*Megachile* and *Osmia*) are the principal ones of this division. There is another large group of six genera, that have no special provision for carrying pollen; and they need none, because they do not collect any: they were named by the Rev. W. Kirby "Cuckoo bees" from the resemblance their habits bear to those of that bird; but more of them anon.

The males in all are harmless insects, though some of them look far from it with their large forcipate mandibles; and when held in the fingers work their bodies about as if they meant stinging; but it is only the females and neuters that are furnished with that weapon. The males also differ in having thirteen joints to the antennæ, whereas the female has only twelve: the latter generally has that member sub-clavate and geniculated, the former usually more or less filiform; the male has seven segments in the abdomen, the female has six, and in one genus only (*Anthidium*) is smaller than the male.

They are separated into two great divisions; in the first of these the tongue has two folds, and in the other three; the former are called *Andrenidæ*, or short-tongued; the latter *Apidæ*, or true bees. The *Andrenidæ* are again obtuse and acute-tongued. There are two genera of the obtuse tongues, one of which (*Colletes*) bores its tunnels into the earth, dry banks or walls, and the other (*Prosopis*), a small black bee, bores into dead branches of brambles and rose-trees—in fact, in any ready-made hole, or into dry banks. The hole being made or provided, they construct a cell, like a thimble in form, by lining the bottom of the hole with a secretion from the mouth, which dries and looks like gold-beaters' skin. Having collected sufficient honey and pollen, which is placed at the bottom of the cell, the insect lays an egg on the mass, closes the mouth of the cell and proceeds to form a fresh one, joining to that already made. In this way she makes several of these cells, and then closes the mouth of the burrow, if in the earth, with soil. The obtuse tongue of these bees seems admirably adapted to plaster the cells with the secretion.

I once found a nest of the smaller genus (*Prosopis*), in which the insect had either forgotten to lay its egg or the egg had died, for at the bottom of the cell was the collected mass of honey and pollen, which under the microscope revealed the fact that the insect had formed it into small pellets, had covered each with the same secretion the cells were made of, and then packed them carefully in. This was very interesting, as the bee is almost entirely destitute of hirsuties, but yet is not a cuckoo-bee. The remaining genera of this division are, in the manner of forming their nest and provisioning it, very much alike. They form a burrow in the earth, some preferring hard trodden pathways, others light banks, into which they tunnel from a few to about fourteen or fifteen inches; they then make a gallery, collect honey and pollen, lay an egg, form another gallery, and so on until a sufficient number of eggs are deposited. One genus (*Halictus*), in the female, presents the appearance of having a vertical slit on the upper part of the tail, surrounded by short pubescence; the males are in form cylindrical, with long antennæ, and may be found generally in the autumn on dandelions and flowers of that kind. It is only in the autumn these males are hatched a few days before the females; the former die, the latter hybernate: in the spring they come forth and commence their work of laying eggs, and providing for them when hatched. The duration of the life of these solitary bees is about two months, exclusive of the time they are hybernating, or at least that is about the time a species lasts. The only other genus I need mention of this division is the large one of *Andrena*, those which in the female have the curled lock on the hinder leg. There are between sixty and seventy of them, varying greatly in size and colouring. Of these the males and females are seen about together at the same time, and do not hybernate. They are represented, from the very first fine warm day in spring till late autumn, by a succession of species. All these bees are solitary, each pair having a separate burrow formed by the female; but often they are gregarious, and may be found in colonies. Being solitary, there are only two sexes, and not three, as in the social ones (the Bumble and Hive bees).

Most flowers are frequented by bees for their sweets; in fact those sweets may have been so placed that the bee in rifling them should greatly assist nature in disseminating the pollen from one flower to another. The front part of the head of most of them has a tuft of pubescence more or less dense, which is admirably adapted to brush the pollen off one, and on to another. It is said, but I know not with what truth, that a bee gathering pollen collects but from one description of plant at a time, thus preventing the chance of hybridization. I have indeed observed on the belly of the Leaf-cutters, pollen sometimes pink, sometimes dirty yellowish-white, and sometimes a deep yellow; but I have never seen it mixed. The *Apidæ*, true or long-tongued bees, are the more interesting of the two divisions, the economy of these displaying a much higher standard of instinct than the others, if it be not a species of reason. The Cuckoo-bees are almost the first on the list: one large genus of these (*Nomada*) are called Wasp-bees, from their great resemblance to those insects; but the tongue proves them not to be wasps, but bees. They are very handsome insects, and are variegated with black, red, yellow, or white. It is a constant peculiarity that while all the females have red noses, all the males have yellow ones. Many of them of both sexes, on being handled, emit a very pleasant and powerful scent: it is not, however, confined to this genus, but is possessed by many others, chiefly the males. They may generally be observed, especially in the spring, flying about dry banks, in search of the nest of some constructive bee, in which, when found, should sufficient food have been already stored by the proprietress, the bee lays its egg; if not, it looks for another, or will wait until this has been done: the parasite being rather smaller than its "sitos," less is needed. When the parent bee comes back with perhaps the last load, and finds the intruder's egg, she does not remove it, as she easily could, but leaves it there and makes preparation for another, the parasite seeming to have the run of the burrow without let or hindrance. These parasites are sometimes in such great numbers as seriously to diminish those of the constructives, especially in the colonies of gregarious species. The *Nomada* are principally parasitic on the two genera mentioned above, the *Halictus* and *Andrena;* one genus (*Cœlioxys*) is parasitic on the Leaf-cutters (*Megachile*), and another (*Stelis*) on the Masons (*Osmia*). The *Dasygastre*, or hairy-bellied bees, which include the Leaf-cutters (*Megaechile*) and the Masons (*Osmia*), are perhaps the most ingenious of the whole, from the diversity and ingenuity displayed in the construction of their nests. The work of the former may be seen in almost any garden. The industrious little creature will rest on a leaf that seems adapted for its purpose, resting with the legs above and below the leaf, the edge of which runs from head to tail. It then with its powerful shears, like mandibles, cuts the piece out, working towards itself as rapidly as we could do the same with a small pair of scissors. When the piece is nearly cut through, she opens her wings and begins to move them, so that when the piece is quite detached, she still holds it between her legs, and does not fall more than an inch or so. The first pieces cut out are oval, with one end slightly wider than the other: these pieces she carries and places at the bottom of the burrow, and laps one over the other until the case is thick enough to hold the honey and pollen with which she nearly fills it; she then lays an egg, and finally closes the aperture with several circular pieces, which she cuts rather larger than the mouth of the case, so that when pushed in, they are kept firmly fixed in their place. She then begins another, placing the end in the mouth of the former, so that it looks like a continuous case. Some burrow in rotten wood, in the earth, and in almost any ready-made convenient receptacle. In general size and appearance they somewhat resemble the common hive-bee, but are broader-built, and have a habit of turning up their rather pointed tails. Three species of the males have a peculiar expanded joint of the fore-leg, the basal joint of the tarsus, which is pale and thickly fringed, but for what purpose I cannot say. The Mason bees make their nests in a variety of places, some in rotten wood, old posts, &c. One burrows into the pith of dead bramble-sticks. A large assemblage of the cocoons of one species was found attached to the under-side of a flat stone. Some will form their cells in the empty shells of *Helix nemoralis* and *aspersa;* sometimes they may be found on a wall so plastered over with mud that the whole looks only like a splash or dab of mortar; and some in the earth. The larva when full grown spins a tough brown silken cocoon, in which to pass the winter, generally fully developed, or perhaps sometimes in the larva state: these insects never pass it in the pupal state: one species or other may be found throughout the spring and summer months of the year. They are, generally speaking, rather more than a quarter of an inch in length, and rather stout for their size; many of them are more or less bronzy, one species very much so. Another group of stout bees are not unlike the Bumble-bee to a casual observer, one of which (*Anthophora*) is to be found in gardens on a most the first fine day of spring, hovering over crocuses and primroses, just like a humming-bird, while its very long tongue, which is porrect, adds much to the likeness. The male is brown and the female black. The former of this whole group has a yellow face with black markings; and another genus (*Eucera*), not very dissimilar, has in the male enormous antennæ, as long as the insect itself. These bees collect on the leg; they make similar cells to the Leaf-cutter, but instead of leaves they make theirs of clay in the earth, and are gregarious; one species place theirs in rotten wood, forming the cells of triturated wood: they have very long tongues. All the bees I have mentioned are solitary, though often gregarious; they are consequently but of two sexes. The next and last, being social, have three, an undeveloped female or neuter being added to the others; and by these the greater part of the work is done. The Bumble-bees, of which we have eighteen species, lead quite a different life to all those previously mentioned. The female hybernates, and quite early in spring may be seen hunting about hedge-rows for a suitable place to commence her nest, or gathering pollen from the catkins of willows and sallows. The nest at the commencement is small, but as soon as the first-laid eggs have passed through the intermediate stages and become perfect bees, which are all neuter or working bees, the nest is rapidly enlarged, and males and females only are found to be hatching at the end of summer or the beginning of autumn. Some of the species appear to be earlier than others. These bees are infested with a parasitic bee, which very much resembles them in general appearance; but of course, not being workers, there are only two sexes of them. These live in perfect harmony with the constructive insect. The males of both are said never to re-enter the nest when once they have left it. The number to be found in a nest varies considerably, some being more prolific than others. Some of them form their nests of moss and grass above the earth, and some in the earth, heaps of stones, &c. The other social bee is the Hive-bee: this I dare not touch upon, for, meagre as this paper must appear when the subject of it is considered, it would be more so were I to attempt in a few lines to write about insects so curious and interesting as these. In conclusion I recommend any who may be sufficiently attracted by my subject to desire to know more of the habits, &c., of bees, to read the works of our well-known authorities, and I venture to say that the more they read the greater will be their astonishment at the remarkable doings of these wonderful insects. J. B. B.

A RIVERSIDE BUNTING.

By W. H. Warner.

THE rambler by the riverside during the pleasant season of the year is certain to make the acquaintance of an exceedingly beautiful bird, which flits about among the reeds and water-plants, shoots ahead with a dipping sort of flight, or else, perched on a giant bulrush some distance away, serenades you with a weak and most unmusical ghost of a song, accompanying his melody with a self-satisfied jerk or flirt of the tail. Barring that gorgeous flash of green and azure, shooting swift as thought over the rippling stream,—I mean the resplendent kingfisher,—there is not, among all the smaller feathered denizens of our rivers and brooks, a more beautiful bird, so far as bold and conspicuous colouring is concerned, than the one under our notice. The male bird, with his jet-black head, snow-white collar, and bright chestnut back, exceeds his mate in richness of hue: her plumage, though similar, being much more sombre and commonplace. Her habits, too, are much less obtrusive than those of her lord.

Ornithologists call this beautiful riverside frequenter the Black-headed Bunting (*Emberiza schœniculus*), and it has, besides, a host of provincial names, the most common, I believe, being that of "Reed Sparrow" or "Reed Bunting," and the most mysterious and incomprehensible, "Toad-snatcher." Why this latter extraordinary name should have been betowed on the pretty subject of this sketch, I am at a loss to understand, its acquaintance with those ungainly reptiles being doubtless limited to an occasional glimpse of the "father of a family," as he pops his ugly "phiz" above water, to take in a view of things in general.

Fig. 25. Riverside or Black-headed Bunting (*Emberiza schœniculus*).

About the middle of May, if business or pleasure takes you to the vicinity of reed or osier-beds (the favourite haunts of the "Riverside Bunting"), you will, in nine cases out of ten, see the brightly-plumaged male perched high on some bush or small tree, repeating his simple and almost monotonous song with great complacency. As you approach, he takes wing, shooting on ahead with his dipping flight, and seeming anxious to gain your notice and attention. Then, provided his domestic affairs are in a certain critical condition, he will reel and tumble about in full view, evidently wishing to distract attention from everything but himself. Pursue him, and he will continue to amuse you with his well-feigned impersonation of a wounded and helpless bird; linger, and his eagerness to attract your attention will become almost comic. Make a careful search around, and if you are gifted with keen eyes you will soon discover the cause of the poor bird's uneasiness, for in some tuft of coarse rushes just raised above ground, lie four or five wee birdies, whose welfare is watched most jealously by "black-cap" and his spouse.

This habit of luring the spectator away from the neighbourhood of its nest is by no means peculiar to the "Riverside Bunting." I have seen instances of the same in the Lapwing (*V. cristatus*), common Partridge (*P. cinerea*), Skylark (*A. arvensis*), &c. On the 1st of last July, when walking near a hedge in a field, a beautiful male Yellow-hammer (*Emberiza citrinella*) flew out, and, pitching just in front of me, began to limp, reel, and tumble in the most curious fashion. Disregarding the pretty creature's deceptive evolutions, I searched the bushes close by, and soon found its badly-concealed nest, containing four imperfectly-fledged young.

The nest of the Black-headed Bunting is, as I said before, placed very near the ground, and is composed of coarse grass, bits of reed, stems of plants, and lined with fine roots and hair. The eggs are four or five in number, of a reddish brown, scrawled and streaked in true bunting style with dark purple-brown.

At the approach of winter the "Riverside Bunting" leaves its watery haunts, and in severe weather is often seen round barns and farm-yards, feeding with corn-buntings, greenfinches, house-sparrows, chaffinches, and other grain-devouring birds.

Kingston, Abingdon.

SPIDERS' WEBS AND SPINNERETS.

HAVING read with interest in some recent numbers of SCIENCE-GOSSIP Mr. Underhill's observations on the spinnerets of spiders and their webs, and the subsequent remarks of Mr. Stratham, who quotes a letter from Mr. Blackwall, the great authority on such matters, I wish, as some years ago I paid considerable attention to the life-history and anatomy of these creatures, to add my little contribution to the general stock of knowledge on such matters.

As my attention was principally directed to the *Epeiræ*, and as Mr. Blackwall says that he would much like to know what Mr. Underhill has to say relative to their snares, I will commence by stating my views on this subject. To make myself understood, I must commence at the A, B, C of the matter. The *Epeiræ* have three pairs of spinnerets; the two larger pair are placed opposite each other, so as to form the bastions, as it were, of a square redoubt, inclosed within which are the other two spinnerets, or third pair. Each of these pairs of spinnerets are provided with a vast number of spinning tubuli, which in each pair differ considerably in number, calibre, and arrangement with regard to each other; and in each pair there are from one to four or five tubuli of much greater size than the others. In short, the tubuli of each pair of spinnerets differ considerably from those of the others. The two exterior pairs of spinnerets are furnished with precisely similar glands, though their tubuli differ; whilst the interior and smaller pair are provided with a totally different kind. The question is, How are these spinnerets used? I have in vain tried to determine this by ocular demonstration, and indeed I fancy it is impossible to do so, though Mr. Underhill states that one kind of thread results from one pair of spinnerets, and the other kind from another. My explanation of the matter is a merely theoretical one.

Fig. 26. Web of Spider, covered with viscid globules.

The *Epeira* has various things to do—to make its web, consisting of scaffold-lines attached to bushes, and converging afterwards by radial lines to a common centre, which are very strong, elastic, and dry; to form on these the spiral and practically concentric lines of the web, which are furnished throughout with viscid drops, a species of birdlime, to detain the prey, which, when thus caught, is swathed round with lightning-like rapidity, in a mummy-like shroud by a secretion shot out from the spinnerets.

In old natural-history books it was stated that the Spider, having spun its web, went over it again, and added the viscid drops; and this was always quoted as a specimen of its perseverance and industry; the late Mr. Richard Beck, however, exploded this fallacy by taking his microscope into his garden, and watching an Epeira making its web, when he saw that the compound line, after its emission, ran of itself into dots by molecular attraction. So far so good; but I have every reason to believe that Mr. Beck had only arrived at half the truth; for on examining a web, I find that the concentric lines run *through* the viscid drops, which appear like so many beads strung on a thread; this of course would not be the case if a single viscid line ran by molecular attraction into drops. Moreover, the thread itself is dry, whilst the drops are viscid.

I therefore infer that two pairs of spinnerets with different kinds of glands are employed simultaneously in forming the concentric lines; viz., one of the exterior pairs to make the thread, which is *varnished* by a secretion from the *inner* pair, as it runs out, and which secretion it is that runs into dots, just as saliva will on a hair passed between the moistened lips. There is plenty of work for the other pair of exterior spinnerets in forming the radial lines, and in swathing round the creature's prey, though possibly for this last operation the whole battery of spinnerets may be used. I have spoken of the spinnerets as employed always in pairs; but it seems to me that this is doubtful, my own impression being that one, as a general rule, is held in reserve, to be employed when the other is exhausted, which I know from observation is often the case.

So much for the Epeira web, and now for *Ciniflo atrox.* I have never had the pleasure of its acquaintance; but hunting for it, after having read Mr. Underhill's paper, I came across a web in a hole of an old elm-tree, which I fancied must be the web of this species. On examination, however, under the microscope, it evidently was not so; and as I have in vain tried to get a sight of the architect, I shall be obliged to Mr. Underhill, or any one else, who will tell me the name of the species. At all events, its web is most curious and interesting; it is not geometrical, and each thread is thickly furnished with dots grouped together in grape-like bunches. No single line could possibly fall into such groups by molecular attraction, and I therefore consider it a further proof of my theory, that two pairs of spinnerets, with different glands, are employed simultaneously in forming the web. That the glands become exhausted by constant use is evident, as I have abstracted their web for the purpose of mounting it each morning, and it has invariably been renewed during the night; but on each successive morning the characteristic conglomeration of dots becomes smaller and fewer in number.

CAPT. LANG.

ON PREPARING ALGÆ FOR THE MICROSCOPE.

HITHERTO my directions have been devoted exclusively to the process of mounting algæ on paper for the herbarium; but I will now proceed to describe my own method of preparing plants for the microscopists, and especially for those persons whose business it is to mount specimens in Canada balsam between circular glasses from 3½ in. to 2 in. diameter (either for the gas lantern or gas microscope), and for the ordinary 3 by 1 glasses for the table microscope. I mention Canada balsam as the medium for mounting algæ as the best with which I am acquainted for preserving the colour and structure of the plants, and also for rendering them transparent.

In the first place, I must observe, that with the exception of the fuci, and some few of the coriaceous and leathery-like red plants, I never put seaweeds into fresh water, nor, when dried, into spirit of any kind. In the first, they are apt to decompose or change colour, and in the latter they generally lose all their natural colour, which no amount of staining can satisfactorily restore. Colour can, of course, be imparted to some of these marine plants, but not the tint of their original endochrome. I have mounted specimens of all the British fuci, but the structure of most of them is so dense and stick-like that it is almost impossible to get the balsam to penetrate them sufficiently to obtain any amount of transparency; but with the exception of these coarse rock weeds, I have mounted specimens of every known British marine alga in Canada balsam, not one of which has lost colour or suffered injury to its structure in any perceptible degree; and the process by means of which I prepared them for the balsam, I will now describe.

Having obtained my specimens, either fresh from the sea, or floated off paper on which they may have previously been mounted, I immerse them, one at a time, in clear, strained sea-water, and wash and clean them well, until, with the aid of a lens, I can discover neither dirt nor parasite on any portion of either side of the plants. This is, with some of the delicate red weeds, occasionally a troublesome operation, for several species of minute zoophytes adhere very firmly to their fronds. However, by pressing a finger of the left hand on the base of the specimen, as it lies in the water, and holding it firmly in the mounting dish, I scrape the zoophytes away with a penknife, which must not be too sharp, and must be applied very gently. As the calcareous particles are detached from the plant, they float away in the water, and an old worn tooth-brush may then be employed to clear off loose bits of shell or sand, and a final washing in clean water completes this portion of the work.

Some of the gelatinous species of green, olive, and red seaweeds may be very satisfactorily mounted on glass while they are floating in the water, especially when large specimens for the gas lantern are required. When this is desired, say on a circle of 3½ in., the glass should be washed clean, and then slipped quickly under the floating weed. Then gently raise the glass at one side until the base of the plant is caught on its surface, and then, by means of a smooth-pointed style of ivory, or a porcupine's quill, display the branches of the weed in a natural manner, as the glass is cautiously drawn out of the water. Put it in a slanting position for a few minutes to drain, and then, having placed the glass on a piece of blotting-paper, cover the specimen with a smooth piece of fine cambric, and then place a piece of blotter on the cambric, employing very gentle pressure, while another specimen is being prepared for another glass. Change the blotting-paper frequently, but use very little pressure, and do not remove the cambric until the plant is quite dry, which it will be in a couple of days. Remove the cambric very gently, and clean away the saline particles which remain on the glass in all directions by means of a finely-cut stump, and finally brush gently with a camel's-hair pencil around and between the branches of the plant, but touch the specimen as little as possible. I have kept plants so prepared on glass wrapped up in tissue-paper for years before they were mounted in balsam. I need hardly say that fresh-water algæ must be cleaned and mounted in fresh water, whether they are to be mounted on glass or paper. Unless the manipulator be skilful in laying on the balsam and placing the glass cover on his specimens, he had better commit his preparations to the care of Messrs. Topping & Son, Mr. J. Bond, or Mr. Norman, the addresses of whom may be obtained from Messrs. Carpenter & Westley, 24, Regent-street, London.

When algæ are required to be prepared loose and dry, my plan is first to provide myself with small sheets of fine cartridge-paper, and having soaked them well in pure salad oil, let them drain well, and afterwards dry them in the sun for a day or two. The specimens, which must be cleaned and washed as already described, may then be mounted on the oiled papers in the clearly-strained sea or fresh water, and covered with cambric and blotter, and subjected to pressure, and the oftener the blotting-paper is changed the sooner the plants will be ready. Upon removing the cambric cover, the specimens will be found adhering either to it or the oiled paper, from either of which they may be easily removed by means of the fingers or a pair of forceps. They may then be mounted in balsam at once, or placed flat between sheets of writing-paper, and if kept from the light, will retain their exact condition and colour for years.

In preparing seaweeds for mounting in Canada balsam, it is of course always desirable to have specimens fresh from the sea; but when these are not obtainable, nearly every mounted plant, with the exception of the gelatinous species, and a few others among the red subdivision, may be removed from paper by soaking them well in water, and employing a porcupine's quill to detach them—a process which requires time, careful manipulation, and considerable patience. W. H. Grattann.

ON WHITE AND OTHER VARIETIES OF FLOWERS.

The following species have been found by me of a clear white, wholly untinged with colour, though they are distinctly, some very strongly, coloured in their ordinary state:—*Cardamine pratensis*, frequently; *Viola odorata*, known, of course, to every one; *Malva moschata*, once only, near Oswestry; *Epilobium montanum*, seldom; *Campanula rotundifolia*, occasionally; *Erica tetralix*, I have white specimens, wild, but the locality, though certainly British, is unknown; *Solanum Dulcamara*, Tunbridge Wells, and near Oxford; *Digitalis purpurea*, in Denbighshire; *Pedicularis sylvatica*, on Tunbridge Wells Common; *Scutellaria galericulata*, around Abingdon; *Polygonum persicaria*, rarely, *Colchicum autumnale*, in Sweeney meadows, near Oswestry. None of the many Floras I have examined speak of a white variety of this plant. Flowers of pure white, however, occur abundantly among the profusion of others of ordinary hue which constitute the autumnal adornment of these low-lying fields, but are not distinguished from them, so far as I could trace, by any other characters; *Agraphis nutans*, occasionally. Other variations in tint which I have noted are of some interest. *Anemone nemorosa*, as it usually occurs, is white, but with a strongly-marked purplish exterior, as if indicating a union between dark sepals and uncoloured petals. The petals are, however, in reality, absent. The purple tint is, of course, a compound of red and blue. I have found the flower vary in the one direction into the total absence of the purple tinge, and, consequently, to perfect whiteness, and on the other to a development of the purple, that hue extending even into the interior of the perianth. This latter variation occurs in numerous degrees, more or less removed from the original point of departure, and taking two separate courses, accordingly as the red or blue constituent of the purple becomes gradually predominant, ending in the production on the one side of a rich pink flower from which all trace of blue intermixture is absent, and on the other of the sweet blue, almost azure, variety for which some spots in the neighbourhood of Tunbridge Wells are noted. All the variations I have named occur around that beautiful inland watering-place, and do not appear to have any particular connection with different soils or situations; indeed many degrees of hue, from blue and reddish-purple to white, are found in company. The richest and purest pink flowers I found on the noble range of the lower greensand, near Sevenoaks.

Polygala vulgaris. The variation of this between perfect blue and perfect pink to a nearly perfect white is well known. I have never found a specimen wholly white, blue being in the so-called white milkwort always more or less present, though sometimes not in a strongly-marked degree, upon the base of the corolla. The pure blue and pure pink are found in the tall, strong, many-blossomed hedgerow form, as well as in the short, spreading plant of hill-sides and heaths; but the white, so far as my experience has gone, in the latter form alone.

Oxalis acetosella is wholly white at times, though usually the delicate veins of the petals are exquisitely lilac in their colouring. But it also alters in the other direction, and is found in the lanes of Treflach, near Oswestry, of a rich and full pink. *Anthyllis vulneraria* has occurred on the Capstan Rock at Ilfracombe, of a pale cream-colour, tinged with blue. That being the first specimen of the plant I met with, it was with surprise I afterwards found how widely it differed from the ordinary yellow flower. *Symphytum officinale*, it may be noted, occurs abundantly around Oxford in two kinds—one of the usual red and purple, and the other with flowers entirely of a yellowish cream-colour.

Oxford. W....

NOTES ON GREENHOUSE PARASITES.

VERY many there be, who are possessed of conservatories and greenhouses, who are perfectly unacquainted with the various kinds of injurious insects that dwell in them, more especially those which feed on the life-juices of the plants, on which, if they are left undisturbed, they will in due time cause their annihilation. Generally all is left to the gardener, who knows the various devices that are requisite for restoring to health the sickly plant. A professed gardener undoubtedly is a luxury; but alas, what does the poor amateur, who may have for the first time undertaken the care of a greenhouse, know about these aggravating insects? When he sees on his plants a curious and unknown object, he suspects it is injuring them—at least he judges so from their unhealthy appearance. Having said this much by way of an introduction, I shall now proceed to give a brief description of these parasites. I shall not, however, allude to the *Aphides*, the most mischievous tribe of all, as in the columns of this journal have appeared from time to time various notes on them. The next greatest pest is the *Thrips Adonidum* (figs. 29 and 30), which in the summer season abounds on every out-of-door flower; as, for instance, the blossom of the Bindweed, Dandelion, Rose, &c. This insect is minute, its colour being generally black or rusty; the abdomen is long and pointed, and its wings are of a dirty white; the antennæ and legs are yellowish, the extremity of the former being black. The larva and pupa are of a pale yellow, and very unsightly to behold, especially when seen under the microscope. These, as well as the mature insect, are found on the underside of the leaves they prey on, which, having pierced, they extract the juice, depositing it in black spots over the leaf. This being of a glutinous nature, fills the pores, and afterwards the leaf turns pale yellow or a sickly green, and falls off. In March the full-grown insects are found collected together, and as the warm sun of spring comes forth, they depart abroad to raise a household for themselves. Another species, called *T. ochraceus*, feeds on fruit, and does

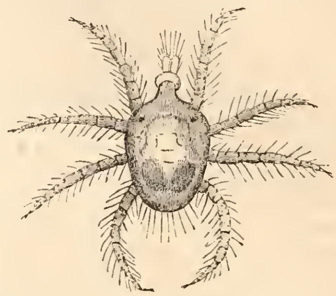


Fig. 27. Red Spider (*Acarus tellarius*), ×30.

great damage to it by piercing the stalks, and causing the fruit to fall off before it is ripe. In appearance it is similar to the above-mentioned

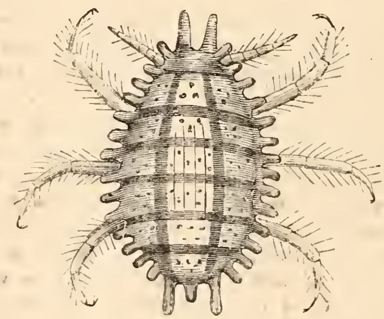


Fig. 28. Mealy Bug, × 20.

one, but is more hairy. The next destroyer appears under the classical name of *Coccus*, or scale insect (figs. 31 and 32). Those generally found fixed on the stem and leaves of the plant are females. They are shield-like in shape, being convex above and flat or concave below; have six small legs; and as the insect increases in age, these grow into their bodies. On the underside of the insect is a sucker, with which it pierces the cuticle of the plant, so as to obtain the desired food. Soon after the female lays her eggs she dies, and her body becomes covered with a long white woolly substance, that guards her eggs during their incubation. The "Cocci" are of various colours, the darkest being generally the fullest-grown: the males are active, and are very small. There are many species of the same insect, known as *C. Vitis*, *C. Testudo*, *C. Hesperidum*, &c. They should be exterminated as soon as they appear, for if let get ahead, there will be great difficulty in effecting this afterwards, as they increase at a prodigious rate. Another pest is the "Mealy Bug" (fig. 28). This is not unlike the common Wood-louse, but is of a reddish colour,

Fig. 29. Full-grown Thrip, × 25.

and covered with a white mealy powder. The male is slender, shaped somewhat like a gnat, has a pair of broad wings, and two brush-like appendages behind. The last member of this craft that I shall

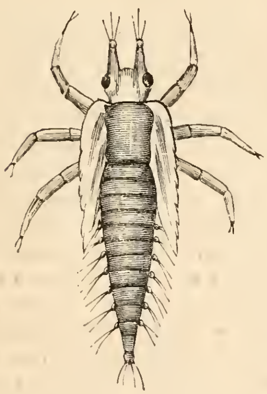


Fig. 30. Larva of Thrip, × 25.

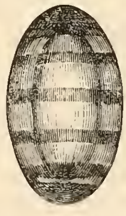


Fig. 31. Upper side of Scale Insect, × 25.]

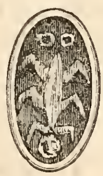


Fig. 32. Under side of ditto, × 25.

allude to is *Acarus tellarius* (fig. 27), better known as the "Red Spider"; in fact, although last named, it is not least in its power of destruction, and the difficulty of eradication: being excessively small, it is not easily seen unless by keen eyes. It is generally of a bright brick-red, yellow or brown colour; on each side of its back is a small black spot: this only is seen when magnified. Its shape is similar to the generality of the *Acari* tribe. It is found on the underside of the leaves of the plant infected; while there it sucks the juices out of them, and by the web it spins from vein to vein, destroys the power of healthy inhalation of the life-giving gas; the leaves then turn of a pale colour and fall off. This in many instances destroys the vitality of the plant. One thing is very remarkable,—how Nature has provided for the safety of these insects by giving them the instinct to hide from general view, on the underside of the leaves, telling them, as it were, "that they are thieves, and must work in the dark." There are many modes for destroying these enemies of vegetable life, the principal being fumigation, syringing, and painting the stems and leaves with compounds of a powerful nature. Deeming it would be unsuitable in this paper to give a recipe for each application, they in fact being "legion," I shall conclude by saying that these are to be found in most horticultural works, which are easily attainable for reference.

Ralph H. Westropp, B.A., T.C.D.

Attyflin Park.

DEFOLIATION, AND SIMILAR VEGETABLE PHENOMENA.

Of all the theories which, intended to account for such phenomena as defoliation, defloration, &c., none of them to my mind can be regarded as satisfactory when viewed in the light of certain well-established facts connected with botanical teaching generally.

The conclusion I have arrived at, is one which being obviously justified on natural, physiological, and scientific grounds, I accept as the most probable and supportable theoretic explanation, as perhaps it is possible to give in accounting therefor.

In the first place we will, in order to comprehend the matter aright, take the conditions necessary to the formation of the green colouring principle of plants,—Chlorophyl. That this must have for its development light, is indisputable; also that it is dependent upon the sap as its distributing medium, is alike incontestable; and then connected with the sap, which I take to be analogous to what blood is in animals, there is another, and that an all-important point, to be recognized in considering the subject,—it is Cold. Now from observation we all know, and that all the better because reminded of it every year, the effects that cold winds, frosts, &c., have upon leaves and other temporary organs of plants, such as the flower and fruit. Still in none of them do we notice it so much as in the leaves. For these, so soon as autumn commences, begin, as a rule, to wither and assume their autumnal tint, and eventually to defoliate. But in this, as in most other things, we have exceptions. Else, what of the evergreens and other plants, as the cabbage and meadow-grass, which maintain their verdure at such times? However, since there cannot in anything well be effect without cause, let us seek what ground they afford us of offering an explanation of such a difference. In doing this we shall not have occasion to look very far before we shall find, in the examination of the leaves of the first, and I might add, main class of plants, *i.e.* the evergreens, something tangible to theorize upon. For regarding the leaves of plants — as is generally conceded — as the lungs, through which the functions of respiration and exhalation take place, we shall not be long, I think, before arriving at something like a definite conclusion on the matter.

In the leaves of evergreens, or as I will now call them for sake of convenience, cold-adapted and heat-adapted plants, there has been made a provision against too rapid exhalation and inspiration, through which they become naturally adapted for both conditions—either of heat or cold. Hence, bearing in mind what has just been stated in reference to the relation which the chlorophyl sustains to light, warmth, and sap, and also of how this latter stands affected to cold, there will be perceived the feasibility of the conclusions I am here seeking to establish; and to show that, as in cold-adapted plants so in tropical, the same conditions are necessary to meet either extreme, I need only mention the fact that were it not so, they would not be fitted to protect the sap against the too detrimental effects of extreme cold on the one hand, or of heat on the other, because the sap in plants, as in animals, is the life; and consequently connected with the presence or absence of which, in part or whole, will be the corresponding issues—life or death, of that part or whole.

The nature of the protection of the leaves of these plants, as contrasted with those which are so readily and lengthily kept denuded, will be perceived to consist in their clothing membrane or epidermis being formed, in point of texture, much thicker and stouter. It of course is this increased thickness and hardened texture of their epidermis which give the leathery or woody leaves of evergreens their peculiar appearance and consistence, enabling them to withstand external influences of heat and cold so long. So in respect of young shoots; these, when they emerge from the bud, are covered by a delicate epidermis, by which they are enabled to retain their green colour and succulent condition for some time. Seeing then that the epidermis is so specially designed to prevent a too rapid evaporation of fluid matters from the tissues beneath, so must it follow that, according to the nature of the epidermis will its adaptability or non-adaptability be in protecting the sap; just in proportion to which being protected, will the greenness and vitality, or otherwise, of the leaves be made manifest.

It might be asked, what can be advanced to account for plants in whose foliage the same conditions are wanting, as in evergreens, cabbage, and some of the grasses? To explain this, I regard it as of primary importance that the same facts be still borne in mind with which I started, coupling them with considerations such as these:—(1) The relative difference between the temperature of the earth and that of the atmosphere; (2) the close connection existing, as a rule, in all such instances (for be it here remembered these plants are mostly acauliferous) between underground stem and leaves of these plants. For such cases, where we have the sap laid up in a part so protected as an underground stem, from which the leaves do so immediately spring, can scarcely fail but to maintain a sufficiently vigorous vitality in the leaves themselves.

Upon an almost similar principle is it that I account for the reason of petiolate or stalked leaves falling more readily than those that are sessile—the two cases being almost parallel. Of course, viewing, as must be done for the sake of analogy, that the woody stem to which such a leaf is attached, and its petiole, as each severally corresponding to the protecting nature of the earth on the one hand, and the exposed stalk to the subterranean and consequently protected stem of the other, it will be perceived how it stands to sense why such a leaf should sooner defoliate than the other, where no such inter-appendage as a leaf-stalk divides the two, because the petiole cannot be regarded as a whit hardier than the leaf itself, since both, in point of system, are similarly constituted.

I do not intend that what I have just said should apply to others than perennials, that is, plants that live for many years, and not of those which by nature are limited to a fixed term of one or two years. But even connected with the fruiting and defoliation of these, and indeed all of them, there is something to be learnt. For is it not notable that defoliation in no case precedes fruiting, but succeeds it? And why? I think the answer is not far to seek, even to one very moderately qualified in the rudiments of botanical science. Is not the period of fruiting one in which the secretions are more attracted, and perhaps altogether in the case of annuals and biennials, to the fruit?—hence most probably their death. Whereas in the case of others this process of developing and maturing their fruits would appear to be only so far exhaustive of the energies of the plant as to partly deprive the leaves of their vitality; and thus aiding their defoliation,—a theory, by the way, which seems to be well substantiated in the case of the holly, which is known not to shed its leaves till early in the spring, directly after the berries have ripened. Now there is, I know, a very common, though notwithstanding, erroneous impression among some people that the holly never sheds it leaves at all; but this no doubt arises from the fact of its never being seen perfectly denuded thereof; for no sooner do the old ones drop than fresh ones appear;—hence in such a sense it is evergreen.

What makes me attach still more importance to the effects which flowering and fruiting have in partly aiding defoliation, is due to the case of a tree, possessed by a friend of mine, coming under my notice only a short time ago. This tree, which he has had now for close upon four years, has never parted with a leaf during the whole of the time, yet looks as healthy and vigorous as ever it did. Now I cannot account for this on any other ground than that of its never having flowered in the time. Certainly the plant is not elbow-jointed where the leaves join the stem; still I cannot see how this can well be accepted as a main cause. Then there is the question of articulation to be considered as effecting defoliation. This ought not, as some seem to do, to be regarded as fully causative. It may, and indeed no doubt does, after the sap becomes less active through the chilling influence of cold, or other causes, induce the leaves to fall more rapidly; still even this would be very much dependent on the nature of the wood of the plant. To mention a case as illustrative of this point, I would allude to the beech—a tree, among others, that retains its leaves in a decayed condition throughout the winter, even to the shooting of the buds. Now I am so bold as to think that even their points of attachment would become very much strengthened could but the vitality of the leaves be maintained beyond a year or so under favourable climatical influences.

Then as to trees, there is another thing which ought not to be lost sight of in the consideration of this subject. I refer to their height, and the increased coldness to which the leaves are as a consequence subjected, all which must have, and especially in cases where the leaves are tender and gifted with "free lungs," a very great influence in hastening and prolonging their nudity. In proof of this witness the effects of a mild winter; for scarcely will vegetation have had time to replenish itself from the impoverishing effects of fruiting before the activity of the sap will be again manifesting itself through the appearance of buds, showing how cold keeps in abeyance the sap, and chiefly through that causes defoliation and lengthened nudity, and also where in some instances it has reached the plant in its most sheltered parts—the roots—it has killed it altogether.

Perennials, or those in which such phenomena as defoliation, &c., take place, are for the most part ligneous or subligneous in their structure; and depending upon this is their power of endurance and resistance. Hence I take it that the leaves, flowers, and fruits, together with their petioles and peduncles, being chiefly made up of a softer tissue, are sooner perishable, and as a consequence fall away. Especially so does this appear in a measure partly explanatory of such phenomena, when we don't find, as a rule, such appearance occurring amongst plants which are herbaceous, or, in other words, those in which the parenchymatous system predominates throughout; as in these we find all equally perishing throughout, without any such separation of parts. Apparently confirmatory of this we will take the effects of a keen prolonged frost upon newly-formed wood or young branches; the result being that of its becoming nipped, giving rise to what here might also be equally and feasibly claimed as the "Phenomenon of Delignization."

As to what appropriate warmth, soil, and moisture will do in keeping up the vitality and foliage of plants generally, we have well exemplified at home in our nurseries, where a case of *complete* plant-nudity would rarely or ever be witnessed. We have but to study the geographical distribution of plants in order to gain a correct knowledge of how far soil and climate go towards influencing vegetable growth. If, for instance, we were to go to Egypt, we should there find plants going through the phases of their existence in one half the time they do here. But, on the other hand, we should find, as we proceeded from warmer regions towards the poles, that, as the light and heat diminished, the vegetation is checked in the same proportion; proving that it is only where the sun rises highest in the ever-cloudless heavens that vegetation flourishes in the greatest luxuriance, and assumes its most majestic form.

I hope that this imperfect paper may be the means towards eliminating something further on this most interesting subject through the pages of Science-Gossip.

Sheffield. John Harrison.

EXOTIC ENTOMOLOGY.*

There are few living authors who have introduced more students to the various branches of natural science than the Rev. J. G. Wood. As an author he has the happy knack of immediately striking a friendship with his readers, unless, indeed, they are more captious than usual. The entire field of zoology has been roamed over by him, and there is hardly one of its corners he has not explored. The wonder is, not that amidst so many books written by one man, there should be some errors in fact and errors in judgment, but that there are so few. If there is a tendency sometimes to dismiss those leading speculations which are agitating the minds of the best and most philosophical naturalists in the world, somewhat contemptuously, it is because

* "Insects Abroad; being a Popular Account of Foreign Insects." By the Rev. J. G. Wood, M.A., F.L.S. London: Longman, Green, & Co. 1874.

Mr. Wood does not pretend much to philosophy; nor do we think he has yet appreciated the many suggestive hints which the new school of thought is silently working out. He is a simple narrator of outcry for "facts" among those who regard evolution as only another name for atheism, as the Roman maiden demanded the brazen shields of the soldiers. These people know not what to do

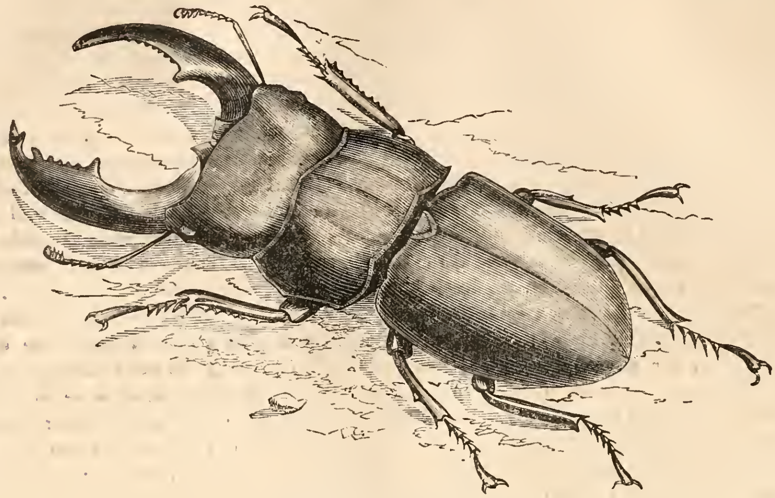


Fig. 33. *Eurytrachelus Titan.*

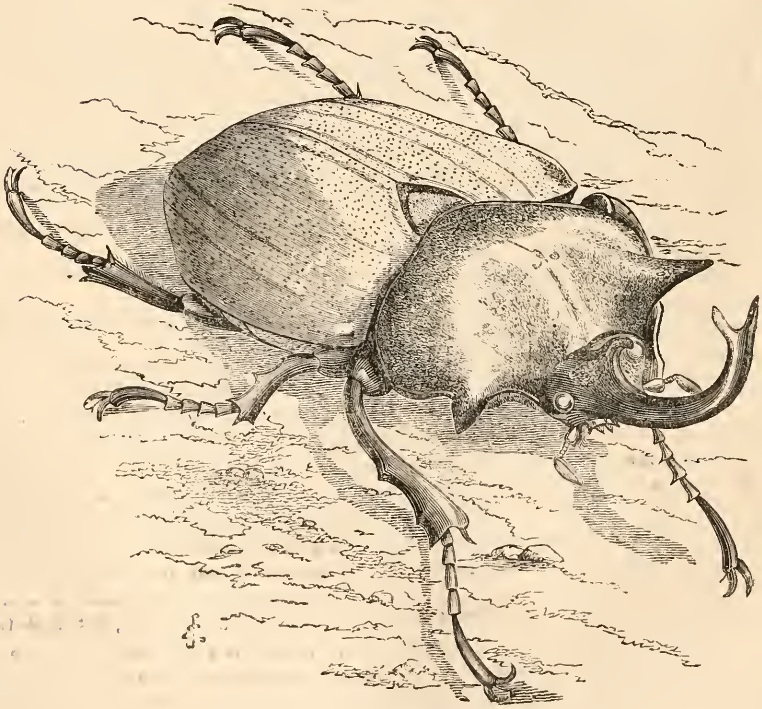


Fig. 34. Elephant Beetle (*Megalosoma elephas*).

acts, as correctly as he can make them out. These are undoubtedly important if well arranged and thoroughly understood. There is a pretended with facts when they are put into possession of them, and are borne down to the earth, and helplessly crushed beneath the overwhelming mass of

Fig. 35. Homopterous Insects (*Cicada adusta; Hotinus maculatus*, and *Pœciloptera circulata*) on cluster of Orchids.

"facts" which every day are crowding before our notice.

Mr. Wood is not one of these ignorant pseudo-critics: his books always strike one as thoroughly genuine. Their tone is quietly earnest, and the literary style of them all is most admirable. In his "Insects at Home," Mr. Wood compiled a large and most useful volume of entomological reference, well written, and equally well and copiously illustrated. But the shelves of most natural history students contain works on British entomology, whereas exotic entomology has been, in England, but feebly represented. Our museums often contain magnificent specimens of tropical lepidoptera; but how rarely do we find even a few of them properly named. Then as regards many other kinds of insects, the foreign beetles, fireflies, mantids, ants, &c., the only information we have is sparsely scattered through books of travel, or meagrely given in brief sketches.

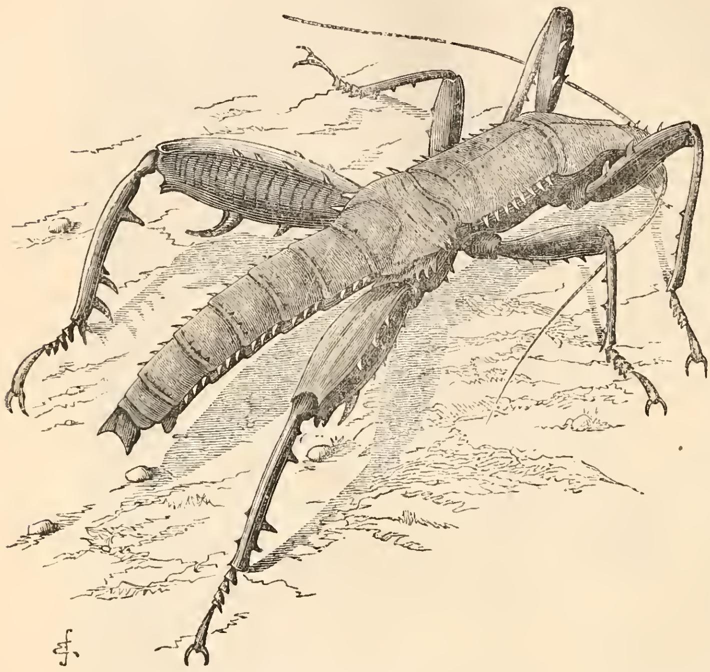


Fig. 36. Walking-stick Insect (*Eurycantha horrida*).

We hail Mr. Wood's book on foreign insects, therefore, with much pleasure, believing that a popular well-written work of this kind was much wanted by the intelligent reader; and that Mr. Wood was just the man to write it. It is a companion volume to "Insects at Home," containing nearly 800 pages, with six hundred illustrations and full-sized plates. The letter-press is clear and pleasant to the eyes, whilst the style of wood-cutting may be best judged of by the few blocks which have been kindly lent us for that purpose by the publishers. The larger illustration shows a group of homopterous insects, chiefly *Cicadas;* whilst the figures of the *Eurytrachelus Titan*, a beetle more than four inches in length; and the still larger "Elephant Beetle," *Megalosoma elephas*—a splendid insect, black, covered with chestnut and yellow fur—will give the reader fair examples of the average merits of the wood-cuts. In fig. 36 we have a specimen of the curious order of *Ambulatoria*, or walking-insects, about which so much interest hangs, from the strongly marked mimetic features they dispay. The illustration is that of the *Eurycantha horrida*—a name well deserved, for the insect is thrice the length of its portrait as here given. It is a native of New Guinea, and its eggs are said to be as large as those of the small humming-birds. A peculiar fact marks the larval stage of this insect. If one of the limbs happen to be lost, it is immediately replaced by another.

In fig. 37 we have the magnificent and well-known black and green butterfly, *Papilio palinurus*, whose under surface presents such a marked contrast to its upper. Fig. 38 gives us an instance of strongly-marked *mimicry*, not unlike that which exists in our own male "Orange-tip," or still more, in some of the tropical "Leaf-insects." This object is *Kallima paralekta*. The illustration wants some little explanation, for the artist has represented the butterfly with closed wings, at rest on a twig, one of whose leaves is mimicked by the reposing insect. This butterfly has been already described in Wallace's "Malayan Archipelago." It occurs in dry woods and thickets, and so wonderfully do its markings protect it, that even Mr. Wallace, trained and skilled entomologist though he is, could not find this insect when he was pursuing it, and it happened to alight even near him!

The general reader will peruse this volume with much interest and pleasure; and the young naturalist will often turn to it for information that he can with difficulty procure elsewhere. Of course the author does not pretend to do other than delineate the best representatives of each order. To do more, especially in exotic entomology, would prove a task

Fig. 37. *Papilio palinurus.*

Fig. 38. Butterfly at rest on a branch whose leaves it mimics (*Kallima paralekta*).

that would paralyze even Mr. Wood's powers of literary work.

MICROSCOPY.

Diatomaceæ of the Carboniferous Era. — Count F. Castracane, a well-known microscopist, and investigator of those minute but exceedingly interesting organisms, has (says *Der Naturforscher*) announced to the Accademia Pontificia at Rome, that he has been fortunate enough to prove the existence of diatomaceæ during the Coal period. His first object of investigation was a piece of Lancashire coal, which was pulverized and then exposed to a white heat. The decarbonized dust is then treated with nitric acid and chlorate of potash in test tubes, and washed clean with distilled water, and then placed under the microscope. The diatomaceæ found in this coal belong, with the exception of a *Grammatophora*, of a small *Coscinodiscus*, and of an *Amphipleura*, entirely to fresh-water genera and species, such as the following: *Fragillaria Harrisonii*, Sm., *Epithemia gibba*, Ehbg., *Nitzschia curvula*, Kz., *Cymbella scolica*, Sm., *Synedra vitrea*, Kz., *Diatoma vulgare*, Bong. The presence of the marine forms, which were present among the very numerous fresh-water diatoms, only in one single specimen, appears to prove that, at one time, even sea-water found its way among the vegetation from which the coal under investigation originated. Besides this Lancashire coal, Count Castracane investigated coal of the Carboniferous era from other locations, as, *e.g.*, a piece of the so-called Cannel coal from Scotland, from Newcastle, and from the mines of St. Etienne. In every one of the pieces, the presence of diatomaceæ in greater or less numbers was proved. And in none of the specimens was there a single form found which did not belong to fresh water. The species varied in the three different specimens of coal, but, as in the case of the Lancashire coal, not even a single new form was discovered, but all closely agreed with the existing freshwater diatomaceæ, from which they could not be distinguished by the most practised eye. The shapes of the coverings, the details of the structure, form, and number of the markings,—in short, all the signs by which the species of diatomaceæ are generally distinguished, are, in the diatomaceæ of the Coal period, identical with those of existing species; so that these organisms, in the indeterminably long period from the Coal epoch to the present time, have undergone no perceptible modification.—*J. S. Hill.*

Yeast in Media free from Oxygen.—M. Traube has described certain experiments which tend to prove Pasteur's doctrine that yeast may be originated in the absence of free oxygen, to be erroneous. When care was taken to exclude free oxygen by means of a stream of carbonic anhydride no yeast was formed, even in the case of fermentable liquids, which rapidly developed yeast on exposure to the air. Ready-formed yeast, however, can increase when free oxygen is excluded, but there is reason to believe that the oxygen required for this increase is not derived from sugar, but from albumenoid substances, as the yeast was found to cease growing while unaltered sugar remained in the liquid. When oxygen is excluded, yeast can produce fermentation in pure sugar solution; but in this case the yeast does not increase. It seems probable, therefore, that fermentation is not a purely chemical but a vital process.

Microchemical Examination of Angustura Bark.—The *Journal of the Chemical Society* states that when thin transverse sections of true Angustura bark are examined under the microscope, and compared with sections of false bark, both being moistened with glycerine, irregularly scattered cells will be observed in the true bark, whereas the false bark presents two zones of sclerogenous cells entangled with one another. When the sections are moistened with water, cells containing calcium oxalate are seen in the true bark, but they are absent in the false bark. When true Angustura bark is moistened with nitric acid, a granular substance, supposed to be *cusparin*, melts in each cell, with disengagement of gas, into a red liquid, which finally disappears with excess of acid; but in the false bark the coloration spreads through the tissue. When a thin section of the suberous layer of false Angustura bark, first treated with nitric acid, is immersed in glycerine, the cells are observed to be rounded, empty, and coloured emerald-green on the sides: this appearance is not observed in the suber of true Angustura bark.

ZOOLOGY.

The late Charles Kingsley.—All true naturalists will mourn the loss of this earnest and genial popularizer of modern science. Our columns have frequently been enriched by his kindly answers to querists, for he was one of those who did not think it beneath him to help a learner out of a difficulty. His memory will live long in the hearts of many young naturalists, whom he introduced to some of the marvels of God's creation; and our library shelves will long continue to bear his volumes, for the sake, not only of their suggestive science, but for the clear and manly English in which they are written. Charles Kingsley occupied a place in the debatable ground between theology and science which it will be hard to fill.

Rare Birds.—It may interest your readers to know that on the 6h ult., on the Burrows, near Bideford, I had the good fortune to observe, among the flocks of larks and other birds, numerous snow buntings. I obtained two specimens, both very fat, their crops being full of small seeds. A specimen of the shore lark was also shot, and others seen. Are not both of these birds rare so far south as Devonshire?—*E. V.*

Pathology of Oak-galls.—At a recent meeting of the Linnean Society, Dr. Hollis read a paper on the pathology of oak-galls. Oak-galls may be divided into two classes,—the unilocular or one-celled, which include the woody marbled oak-galls, the ligneous galls of Réaumur, and the currant leaf-galls; and the multilocular or many-celled, including the spongy oak-apple and the oak-spangles of the leaves. The author went with some detail into the structure and history of development of each of these kinds, taking a few examples of each. With the exception of the oak-spangles, all the different kinds appear to be formed during the growth of the leaf. The pathological differs from the healthy development in the more rapid growth of its cellular elements and in the larger size they attain: this is gained at the expense of the differentiation of the matrix of the bud. The author traced the origin of the different layers of the gall itself to the different layers of the leaf from which it is produced.

Zoological Society.—At a recent meeting, Professor Newton, F.R.S., gave an account of a MS. in the French Archives de la Marine, which contained some additional evidence as to the original fauna of Rodriguez, and called special attention to the unknown writer's account of the terrestrial birds of that island, amongst which were mentioned the "Solitaire," the *Erythromachus leguati* of A. Milne-Edwards, and other now extinct forms. A communication was read from Dr. A. B. Meyer, Director of the Royal Natural History Museum, Dresden, containing the description of a new Bird of Paradise, skins of which had been sent to him, and which it was proposed to call *Diphyllodes Gulielmi III.* The habitat of this new bird is stated to be the inner mountains of Eastern Waigiou.

Fishes of the Mammoth Cave.—Professor Putnam has recently made some interesting additions to our knowledge of the fauna of this remarkable cave. He passed ten days in the Cave, and succeeded in obtaining large collections of its inhabitants. Among them were five specimens of a fish, of which only one individual had heretofore been known. This was obtained in a well in Lebanon, Tennessee. Professor Putnam had previously described it under the name of *Chalcologaster Agassizii*, and as being of a dark colour, and very different in its habits from the blind fishes of the Cave. It lives principally on the bottom, and is very quiet in its motions. It belongs to the same family as the two species of blind fish found in the Cave. Professor Putnam also obtained fine specimens of four species of fishes that were in every respect identical with those of the Green River, showing that the river fish do at times enter the dark waters of the Cave, and when once there apparently thrive as well as the regular inhabitants. A large number of the white blind fishes were also procured from the Mammoth Cave and from other subterranean streams. In one stream the blind fishes were found in such a position as to show that they could go into daylight if they chose, while the fact of finding the *Chologaster* in the waters of the Mammoth Cave, where all is total darkness, shows that animals with eyes flourish there. Professor Putnam found the same array of facts in regard to the crayfish of the Cave, one species being white and blind, while another species had large black eyes, and was of various shades of brown colour. A number of living specimens of all the above inhabitants of the waters of the Cave were successfully brought to Massachusetts, after having been kept in daylight, proving that all the blind Cave animals do not die on being exposed to the light, as has been stated.

Tengmalm's Owl.—It may interest some of the readers of Science-Gossip to hear that a specimen of Tengmalm's Owl has been taken in this neighbourhood. It was shot by a son of the gamekeeper of the Egton estate as it was sitting in a tree. Hearing that a small species of owl had been killed, I sent for it and stuffed it, expecting it was the Little Owl; but after seeing a description of Tengmalm's, I thought it was the latter, and sent it to a friend who knows them well. He returned it last week, saying it is Tengmalm's Owl without doubt. As it is not a common bird, I thought a notice of it might be acceptable. — *Wm. Lister, Glaisdale, Yarm.*

The Position of Hybernating Wasps.—I last season placed a piece of wood in our garden, in which I had made some holes, to try and induce a leaf-cutter bee to form her nest in it. I did not succeed in this; but on examining it this morning, I found three wasps (*V. vulgaris*) hybernating therein. What struck me was the uniform and peculiar way in which they had folded their wings: the abdomen was slightly curled; the antennæ, anterior and intermediate legs were folded close to the body, and the folded wings, instead of being along the back, as is usual with these insects, were brought beneath the body, behind the posterior legs, and laid side by side, the tibia of the posterior legs passing over the wings, as if to keep them down; and the tarsi were between the abdomen and the wings. I have sent this—it may be nothing new after all; but I never saw it before, or remember to have seen it noticed.—*J.B.B.*

BOTANY.

Alpine Botanizing.—Having read with much interest the paper on "Alpine Botanizing," which appeared in the January number of Science-Gossip, I should like to add a few remarks, as suggested by the writer at the close of his paper, which may be of further service to collectors. I quite agree with the plan recommended of putting the plants as soon as possible under a *heavy* weight, and the very simple expedient of placing the drying-case each night under the mattress of one's bed, answers admirably, insuring a useful amount of weight and also heat, which is most beneficial in drying flowers. Collectors will do well always to furnish themselves with a book, in which to mount their specimens when dried; with a small bottle of adhesive cement and a brush, for fastening them in; and some strips of paper gummed at the back, for the stems and thicker parts of the plant. None of these articles take up much space. The gummed paper is kept in the book, which is strapped to the drying-case, while the cement and the brush are not a great increase to one's pocket, or a wallet, which is a useful adjunct to all tourists. Dried plants do not keep well unmounted, especially during a journey; the sooner they can be mounted the better, for I am convinced that this helps to preserve the colour. I have now some beautiful blue Gentians, which were gathered on the Rigi, in June, 1873, and have retained their tint almost perfectly; these were in press I think only two, at most three days, and were then transferred to my book; it is true they were not then fully dry, but I do not think it is always necessary that they should be before mounting, as with a piece of blotting-paper over them the process of drying still goes on. *Alchemillas*, *Gnaphaliums*, and other hard plants, may be put into the book with advantage the day after being gathered, and their colour will be found to be much more permanent than if allowed to be all absorbed by the blotting-paper. The advantages of this speedy mounting during a tour are manifold; besides those above mentioned, there is always much more interest attaching to the flowers before they have lost their first beauty; if they are kept unattached for several weeks, waiting to be mounted, it is very probable that in many cases they are sacrificed, whereas, by placing them at once in a book, with the locality and date of finding, they furnish a pleasant memorial of one's journey, and formed with very little trouble, and without a great tax on one's memory or time, while the much-needed space in one's drying-case thus given is no little boon. Of course, this plan is one only suited to amateurs (or as an additional collection to the more scientific one of the regular botanists), the objection being at once felt, that where it is pursued, there is almost an impossibility of classification. However, if the object of the collection is to preserve reminiscences of a summer trip in the Alps during holiday time, I think the collector will be well rewarded, and may leave his more scientific friends to pursue botany as a *business*, with more method and more leisure. It is sometimes well to empty out one's drying-case, and let it dry thoroughly in the sun, or on a stove. When flowers grow much clustered together, or have very fleshy stems and leaves, it is always advisable to remove the flowers, and press them quite separately in a pocket-book, or any odd volume one may have at hand; if not, the blossoms are almost sure to be spoiled, while, with a little care, there is no difficulty in building up the plant again in a perfectly natural manner, when ready to be mounted. It is interesting to obtain, if possible, all the parts of a plant, including the root and seeds, as only a very partial knowledge can be gained from the flower and leaf alone, these only being often all that is to be found in amateur collections. At the poverty and meagreness of these I am sometimes surprised; but I think decided improvements may be obtained by attending to the valuable hints of Mr. Howse, and to the above suggestions.—*M. V. S.*

Fleur-de-Lis.—Can any reader of Science-Gossip explain why this flower became such a universal favourite as it is, and always has been, in churches, both ancient and modern, and elsewhere? We find it not only in churches but in heraldry, armorial bearings, crests, &c.; it is also a common pattern for papering walls, especially in parsonage houses; it is also a public-house sign as the "Flower-de-Luce," the name given by old English writers. The name *Lis* is evidently a misnomer, as every one knows the Fleur-de-Lis is always represented as an *Iris*, and bears no resemblance to a *Lily*, although several of the Lily tribe are in France called Fleur-de-lis; it has been said, however, that the word *lis* is a contraction for *Louis*, because the Fleur-de-lis was worn by the kings (Louis) of France as a cognizance in the wars, and originally called "Fleur-de-*Louis*" (or by contraction "lis"). It may, perhaps, have been chosen by the French priesthood not only as the emblem of France, but out of reverence for *Saint Louis*, the ninth French king of that name. The word *Luce* certainly comes nearer to *Louis* than *lis*. The Iris has also been called Lis de Saint Bruno, and probably after other saints also, which may account for its introduction as a church ornament in the middle ages. The Fleur-de-lis forms part of our royal arms, and was probably introduced into England by the Dukes of Normandy, or by the subsequent monarchs of Great Britain, who were styled "kings of Great Britain, *France*, and Ireland." Loudon says the name of Iris was given by Theophrastus, Dioscorides, and Pliny, from the variety of its colours, and that, according to Plutarch, the word Iris signified in ancient Egyptian tongue *eye*, the eye of heaven.—*T. B. W., Brighton.*

The Germinating Power of Seeds.—M. Böttger states that a moderately concentrated solution of caustic soda or potash promotes the germinating power of seeds to an extraordinary degree. If a handful of common coffee-berries are shaken up in a tumbler with a weak solution of caustic potash, snow-white shoots, one or two millimetres in length, will appear, often within the space of two or three hours.

The Glastonbury Thorn.—My descendant of the true tree was full of buds almost bursting before Christmas, but the frosts of the joyous season of this year completely killed some of these early bunches of flowers. However, the fine warm weather we have experienced for the last three weeks has at the present time brought an abundance of buds nigh unto bursting. I have ere now had some well-formed bunches of flowers from this tree fully opened on my dinner-table on our modern Christmas-day; but usually when it flowers so early the flowers are somewhat ragged and imperfect. It does not usually complete its flowering until May, in which case the flowers are usually, though not always, more perfect. The legends about this tree in the West are still believed by many. It is asserted that it was derived from Joseph of Arimathea's staff, which, by the way, was a blackthorn—one of course planted with the small end in the ground. Well, it grew up a whitethorn, and doubtless a mere variety of the *Cratægus oxyacantha.* Of course all this was miraculous; and to this day this thorn is looked upon by many "wold folk" as an astounding miracle, as it is confidently averred that its constant flowering on or about old Christmas-day is an evidence that this is the right day, and as such it is still kept by some. I have met with a similar variety in a hedgerow at Alfrick, in Worcestershire, and very early May-trees are not uncommon in parts not connected with Glastonbury, and indeed where quite a different climate prevails. These seem to be merely varieties which correspond to the early and late sorts of different fruits and vegetables.—*James Buckman, Bradford Abbas.*

GEOLOGY.

The Origin and Mechanism of Production of the columnar Structure of Basalt.—This is the title of a paper just read to the Royal Society, by Robert Mallet, C.E., F.R.S. The author shows that all the salient phenomena of prismatic basalt as observed in nature can be accounted for as results of contraction by cooling in a homogeneous body possessing the properties of basalt, and that the theories hitherto advanced and repeated in text-books of the production of basaltic prisms are alike untenable and unnecessary. If a large level and tabular mass of homogeneous basalt cool slowly by loss of heat from one or more of its surfaces, the contraction of the mass while plastic will be met by internal movements of its particles; but when the temperature has fallen to a certain point of rigidity, reached at between 900° and 600° F., splitting up commences, and that surface will begin to divide itself into similar geometric figures of equal area, which on mechanical principles must be hexagons, the diameter of which is shown to depend upon the relation that subsists between the co-efficients of extensibility of the material and of its contraction by cooling down to the splitting temperature. These hexagons are the first-formed ends of the future prisms, which split deeper into the mass as cooling down to the splitting temperature reaches deeper into it. When the prisms have split down to a certain distance, further cooling proceeds, not only from the ends of the prisms, which formed the surface of original cooling, bnt from the sides of the prisms. Now, as each prism is coldest at the end, and hottest where in the act of splitting, and is also hotter along the axis than at the exterior of each prism, so, by contraction, differential strains are produced in each prism, both parallel to the axis and transverse to it, which result in cross fractures at intervals along the length of the prism, the distances between which the author has assigned. Transverse fracture round the prism must commence in the outer *couche* in a plane normal to the resultant of the contractile strains longitudinal to and transverse to the axis of the prism; the fracture commences, therefore, oblique to the prismatic axis. This obliquity diminishes as the transverse contractile force diminishes, as the conferential *couche* of cooling reaches nearer to the axis of the prism; the result is that the transverse fracture when completed is lenticular or cup-shaped, the convex surface always pointing in the same direction in which the cooling is progressing within the mass. If the mass cool from the top surface only, the convex surfaces of the cup-shaped joints will all point downwards; if cooled from the bottom only, they will point upwards; and if from both surfaces, the convexity of the joints will be found pointing both upwards and downwards in the mass. As the splitting always takes place normal to the surface of cooling, so, if that surface be level and cool uniformly, the prisms must be vertical and straight; also, if the cooling surface be a vertical or inclined one, the direction of the prisms will be normal thereto. If, however, the mass cool from its upper or lower surface, but of much greater thickness in one direction than in the opposite one, the prisms formed will not be straight, but have their axes curved, because the successive couches reaching the splitting temperature successively within the mass, and normal to which the splitting takes place, are themselves curved planes. These are a few of the principal points of this paper, which the author believes renders, for the first time, a complete and consistent account of all the phenomena observed in prismatic basalt. A considerable number of these phenomena were referred to and explained by the author. At the conclusion of his paper Mr. Mallet submits to rigid examination the notions which from 1804, the period of Mr. Gregory Watt's paper (*Phil. Trans.*) to the present time, have continued to occupy the text-books of geologists, and he points out how entirely these fail to account for phenomena.

The Structure and Age of Arthur's Seat, Edinburgh.—Mr. John W. Judd, F.G.S., in a paper just read, says that Arthur's Seat, so long the battle-ground of rival theorists, furnished in the hands of Charles Maclaren a beautiful illustration of the identity between the agencies at work during past geological periods, and those in operation at the present day. One portion, however, of

Maclaren's masterly exposition of the structure of Arthur's Seat, that which requires a second period of eruption upon the same site, but subsequent to the deposition, the upheaval and the denudation of the whole of the Carboniferous rocks, is beset with the gravest difficulties. The Tertiary and Secondary epochs have in turn been proposed and abandoned as the period of this supposed second period of eruption; and it has more recently been placed, on very questionable grounds, in the Permian. The antecedent improbabilities of this hypothesis of a second period of eruption are so great, that it was abandoned by its author himself before his death. A careful study of the whole question by the aid of the light thrown upon it in comparing the structure of Arthur's Seat, with that of many other volcanoes, new and old, shows the hypothesis to be alike untenable and unnecessary. The supposed proofs of a second period of eruption, drawn from the position of the central lava column, the nature and relations of the fragmentary materials in the upper and lower parts of the hill respectively, and the position of certain rocks in the Lion's Haunch, all break down on re-examination. While, on the other hand, an examination of Arthur's Seat, in connection with the contemporaneous volcanic rocks of Forfar, Fife, and the Lothians, shows that in the former we have the relics of a volcano which was at first submarine but gradually rose above the Carboniferous sea, and was the product of a single and almost continuous series of eruptions.

NOTES AND QUERIES.

Vibration of Gnats.—In connection with Windsor Hambrough's note on the vibratory motion of gnats at rest, I may mention that I have often seen spiders when touched, blown upon, or even only looked at, cause themselves to vibrate so rapidly in the centres of their webs that they are for the time invisible, the motive evidently being a desire for concealment.—*W. G. Piper.*

A Novel Mousetrap.—The *Sussex Daily News* states that at Angmering a singular and amusing incident occurred at the house of one of our villagers the other day. It appears that a mouse, being hungry, ventured on the kitchen table. Seeing some oysters with their shells apart, he made up his mind to a quiet repast. He accordingly inserted his head between the shells of one, but the bivalve being still alive, objected to this intrusion, and closed its shell, killing the mouse upon the spot. Several persons were in the room at the time, and can testify to the accuracy of this account.

Frost Phenomena.—When a sharp frost sets in in the Lake district the level of the water in the larger lakes quickly falls as in a dry summer. So noticeable is this, that the boatmen and fishermen say, "the frost nips the water off the lake." The real reasons are, I believe, obvious. In frosty weather the rainfall ceases, the drainage and the rivulets (the feeders of the rivers) on the mountains are very quickly frozen up, the outflow from the lake all the time going on freely unimpeded by the frost, because the volume of the stream is large, and much nearer the sea-level. Although not exactly bearing on the remarks by Mr. H. B. Bidden, in your last, I ask an explanation of the following: I cannot reconcile the existence (as we had it on the north-west coast at the end of December) of a very thick fog over land and sea for four or five days and nights continuously, without any wind, and with the thermometer constantly below 20°, the watery particles not freezing until they touched our hair or rough coats or caps: why didn't the fog freeze and fall as snow? Was motion of the air required to induce crystallization? Then when that motion was artificially produced (by the passage of a quick railway train or a steamboat), why did not the watery particles freeze? During one of the coldest nights the water in the bottle on my dressing-table was frozen solid, but the bottle was not burst in the usual fashion, but the ice was forced out of the neck two inches, raising the glass, which was inverted over it. I imagine this was as good an example of the plastic flow of ice as any furnished by a glacier. The noise during the night while this expansion of the contents of the bottle was going on was disturbing.—*Anthony W. Wilson, Ulverston.*

Do Fishes utter Sounds?—In catching weak fish in the inlets on the Atlantic coast of New Jersey, I have often noticed the phenomenon to which your querist alludes. The sound certainly proceeded from the fish, though, as I venture to conclude, the action which caused it was not intended to produce it; had the fish been in water, probably there would have been no such motions, or the motions would not have produced the sound. —*J. Burkitt Webb, C.E., Illinois, U.S.*

Musselling.—I should feel much obliged if some of your numerous correspondents would throw some light on the cause of the complaint popularly called "musselling." Is it caused by any other kind of shell-fish besides mussels? I have seen it referred to the presence of the pea-crab, to the byssus, or "moss," as well as to the decomposed state of the mollusc. This question is of so much importance, both scientifically and economically, that I should be glad to see it as well discussed in the pages of Science-Gossip as many other subjects have lately been.—*C. B.*

Geranium molle.—There grows on a particular hedge-bank near my residence, a perfectly white variety of, I believe, *G. molle*, though it seems to have a stronger musky scent than that species. As several botanical friends to whom shown are unacquainted with it, I should like to know if any of the readers of Science-Gossip have met with it elsewhere.—*W. Henidge, Wincanton.*

Marine Aquaria.—Some years ago, after many failures, I succeeded in keeping a small marine aquarium in perfect order for a long period, and the result of my experience may be of use to some of the readers of Science-Gossip. Any kind of sand is suitable for the bottom, if washed perfectly clean. I tried a variety of the larger algæ, such as are usually put in aquariums, but found none of them quite satisfactory. Ultimately I entirely depended for a supply of oxygen to the inhabitants of my aquarium on the minute green algæ that are sure to come sooner or later in all aquaria, and cover the pieces of rock, &c., like green velvet. I differ from your correspondent W. H. Rean in regard to feeding. Meat, which he recommends, is never entirely digested by anemones, but is voided after a time, and often spoils the water by putrefying in some unnoticed corner. I found a small portion of the white of a boiled egg free from this objection, and that it was readily taken by anemones, prawns, crabs, &c. The starving system recommended by W. H. Rean must cause many of the anemones to remain unexpanded for days together. They appear to greatest advantage after being fed, and a fine *Dianthus* after a meal is a sight to be remembered. Many failures with aquariums are caused by a bad aspect. By far the best aspect is one near a window facing due north. A marine aquarium in which the water is deep, is a constant source of vexation to its owner, and can only be made to succeed by having a stream of water constantly running through it; an arrangement which few can attempt. It is best to have the deepest part of the water in front, and to pile up the rockwork at the back till it reaches the surface of the water. It is well to aërate the water daily with a glass syringe. When once a supply of sea-water is obtained, not a drop need be wasted, even though, through the death and putrefaction of some of the animals, it is opaque and smells offensively. It can be restored to its original purity by exposing it for a few days in a shallow vessel to the open air. To compensate for loss by evaporation, fresh water should be added.—*F. G. Walford.*

Horse-Chestnut.—When in Paris in September last, I was struck by the remarkably wintry appearance which the deciduous trees had already assumed: a remarkable exception was a young horse-chestnut (*Æsculus Hypocastanum*), which had not merely expanded many young leaf-buds, but several spikes of flower in full bloom, though the blossoms seemed individually small. Is not this an unusual occurrence? The tree will surely suffer in the spring. Other specimens of the same tree had only expanded a few young leaves, but I only saw this one in blossom.—*I. G. Halliday.*

Umbilicus in Shells.—Your correspondent C. Jecks wants to know what purpose is served by the umbilicus present in certain univalve shells. I think the only answer to this question is, None at all; it is only an accidental formation caused by the peculiar shape of the shell and its whorls, a consequence of a more or less widely-spread coil of whorls. As far as my experience goes, it is found largest in the flattest shells; many have it in embryo, which in the adult is entirely obliterated by the extension of the lip of the shell. By gradation, shells may be traced from the slightly curved dentalium, to the coiled siliquaria, which shell is more or less of a spiral, but without the whorls touching each other; then to shells with a large or small umbilicus, till at the other end those entirely without umbilicus. I think as well might he ask, why the Terebra and Clausilia should be elongated; the Zonites and Planorbis flat; why some Helices should have thickened reflected lips and some not; why some should have teeth-like processes and others smooth lips; why some shells are smooth and some rough?—*T. B. B.*

The Name "Tray."—A friend suggests, and I think he is probably right, that the name "Tray" was first given to dogs from the trick blind men's dogs are taught, of holding in their mouths a tin cup, or tray, or plate, for money to be dropped in.—*H. Budge.*

Keeping Parrots.—I bought a grey parrot some time ago; he is now dead; the only symptom observable was diarrhœa. Could you or any of your readers give me some practical information in regard to parrots, as to the proper food, &c., and proper treatment in disease, as I am in a quandary. I wish to buy another parrot, and do not wish to lose him. In particular I would like to know if it is proper to give them water; also, if it is well to give them a bath now and then. Should they have fine sand or gravel in their cage? If you could find time to answer the above, either by letter or in S.-G., you will greatly oblige yours obediently, *J. J. M., Montreal, Canada.*

New Zealand Forests.—The reason why the cultivation of the native trees of New Zealand was unsuccessful, as stated in Science-Gossip for December last, p. 281, by *Kaiapoi*, must, I think, be looked for from other causes than that suggested by your correspondent; viz. that the New Zealand forest trees are approaching "the end of the period allotted to their existence," especially as trees from other countries gave promise, when he left, of paying for cultivation. It is a well-known fact that the ground upon which any species of tree has lived and died, will not for a lengthened period sustain the same species. Wherever old forests die a natural death, the trees that spring up afterwards are always different. The reason is obvious. Each species takes from the soil what is necessary to its existence; after that, it cannot be expected that the same species will thrive. There are others that do not require the same nourishment, but will take up as an essential what was rejected by the other. On the same principle the farmer and gardener change their crops, and put into the soil, in the form of manure, the ingredients necessary for the crop they intend to grow. Or perhaps the soil was not naturally suitable to the trees that were tried. Any one who has studied our wild plants in their native homes, cannot help observing that many species are peculiar to particular formations; others again will grow in a great variety of soils and altitudes. Some few may almost be called "Citizens of the World." The above causes are more likely to account for the "natives" not thriving, than that they are approaching the limits of their existence. Cuttings or grafts of very old trees have not such a good chance of succeeding, as they are only part of the old tree; but *seedlings* of the New Zealand trees if transplanted into suitable soil, will, I have little doubt, live and flourish for ages to come.—*A. B., Kelso.*

Hardening Balsam.—Under this heading, in the January number of Science-Gossip, Mr. C. C. Underwood states, that if the object is small he holds it down by a spring clip to prevent displacement, and then drives off the turpentine by boiling, so that the balsam is left in such a condition that the cover will never be displaced. As far as the balsam itself is concerned, I quite agree with his statements, and for some specimens his *modus operandi* is, doubtless, very efficient, but at the same time, there are some which will be entirely spoiled if subjected to this treatment. All animal tissues, if boiled in the manner described, will contract or shrivel up to such an extent, that, if the same section be examined before and after boiling, it will scarcely be recognized as the same structure; therefore, for this class of specimens I would strongly recommend that, instead of being boiled, the thin cover (after the slide is otherwise complete) should be coated round its edges and the angle between it and the slide completely filled up with any quickly-drying cement, such as that composed of equal parts of gold-size and Brunswick black, or what is perhaps better, the India-rubber and oxide of zinc cement.—*J. W. Groves, London.*

As stupid as a Goose!—A common, though unfair saying, this might be demonstrated to be. Geese have their follies and stupidities, though not in a larger share than many of their near relatives. I am told that in the New Forest, where from the cottages and homesteads they are allowed at certain seasons to wander out in the woodlands, it is most interesting to observe how a large assemblage of these birds will, when the time arrives for their return home, break up into its component parts. Not only does each flock know exactly where to return, but also who are members of it, and should any blundering individual by accident get into a wrong party, he or she is soon taught by hostile demonstrations that no intruders will be allowed to fall into the homeward-bound party, though before that they may have been feeding together amicably enough. Even their peculiarity of hissing, with neck extended, at the by-passer, which has been insisted on as a proof of dulness, because it is done in concert without seeming reason, may be interpreted otherwise. Most persons must have noticed that a flock of geese may sometimes be passed without their taking any heed, sometimes not. The reason is stated to be that there is one individual in the flock from whom the rest take their cue, and if he does not trouble to notice the by-passer, the others remain still. Surely to "follow my leaders" is not more foolish in feathered than in featherless bipeds. Apropos of the goose, it is said that in a certain country village this notification posted up by a resident occasioned much wonderment to the traveller. "I cures a goose, my wife cures the janders!" In fact it was inexplicable until inquiry was made, which would result in the discovery that the man, who pretended to possess some medical skill, treated those who suffered from *agues*, and his better moiety professed to relieve those afflicted with *jaundice.*—*J.R.S.C.*

Old Yews (p. 215, for 1874).—Mr. Pryor says that some of the ancient trees mentioned in this extract have ceased to exist since Loudon's work—1838. The Darley Yew was in a flourishing state in 1869. I saw it in that year; the circle, roughly paced, round it was 12 yards. I saw the Fountains Yew, near Ripon (Earl de Grey's), in 1872. One side of it is healthy, but one of the limbs is resting on a crutch, and, if I remember rightly, another is secured by a chain. It is more decayed than the Darley Yew. There is a very ancient yew in the churchyard at Kirkheaton, near Huddersfield; the bark is cut all over with initials. The inhabitants of the village have a tradition that the church, which dates before 1245, was built to the tree, not the tree planted to the church. It was living in 1864, but is now dead. —*G. Roberts.*

Viper-bites.—In the November and December numbers of Science-Gossip I see the fatality of the viper's bite is once more brought up. Undoubtedly the viper is venomous, but I think not fatal; at least my experience teaches me so. Last summer I had upwards of forty vipers through my hands, and I had the fortune of being bitten by four different vipers at four different times, and in no case did I call in medical aid. I did let one medical gentleman see the result just as a curiosity, but nothing further. The only inconvenience I had was a large amount of swelling, a slight discoloration, and a deadening sensation of the arm and hand. After bathing the hand and arm with hot water, and then rubbing with oil, these symptoms gradually died away. I had not the slightest pain from the bite. From this I come to the conclusion that death does not result from the direct cause of the bite, that is, if the person is in good health and of a good constitution. Fontana, the French writer, says in his experiments (and he has tried 6,000), that the viper possesses one grain of poison, and that it requires three grains to kill a man; also that the viper must bite two, or even three times, to exhaust the whole of its poison. I think from these statements the bite cannot be fatal.—*Jas. Kirby.*

Anatomy of the Caterpillar.—I have a great dislike to finding fault or throwing cold water on any one's attempt to instruct and edify others, but I I cannot allow an article like Mr. Tylar's in November Science-Gossip to go unnoticed. Several of the remarks are scientifically untrue, and as such, are likely to do harm in misleading young beginners, who, seeing certain statements in such a reliable publication as Science-Gossip, are apt to accept them as *bonâ-fide* facts. Passing over the diagram and internal structure, I object to his statement that the eyes of caterpillars are compound. Having studied micro-entomology for the last three or four years, I make out the eyes to be simple lenses, varying in number from one to six, situated on each side of the head, just below the antennæ, and by no means compound (as the term is generally understood by entomologists). According to Burmeister (than whom we have no better authority), the eyes of larvæ or caterpillars are *always* simple, and perfectly agree in form and structure with those eyes of the perfect insect, termed ocelli, or simple eyes. Again, the statement as to caterpillars "possessing two kinds of legs—two at the back, called pro-legs,"—although the first portion is right enough as to the two kinds of legs, yet Mr. Tylar ought to know that they usually possess eight pair of abdominal *pro-legs*, in addition to the anal pair (unless, indeed, he has restricted his observations to the Loopers). I have thoroughly examined the structure of these anal pro-legs, but I cannot make out either their structure or functions to be sucker-like, but that they each consist of a broad sole, which is clapper-shaped, *i.e.* composed of an interior and exterior flap, which move in opposition to each other, like a pair of pliers, and thus form a claw suitable for grasping small twigs and the like, whilst the fore part of their body is at liberty to search for fresh foothold. If Mr. Tylar wishes to verify my statements, and to assure himself that he is wrong, I shall be happy to send him a few specimens preserved in glycerine, &c., for further dissection, on receipt of his address.—*J. S. H.*

Old Tales Revived: "The Toad and Spider." — I am surprised to see in your excellent Science-Gossip" for Jan., 1875, p. 21, the old story of the spider and the toad. I have it now before me almost verbatim in Topsel's "History of Serpents," published by E. Cotes, of London, 1658! A severe accident to my right hand prevents me from writing much; but every incident is given, even to the "Herb, which, to his judgment, was like a Plantain" (Topsel, p. 729). The original narrator was "a true honourable man, and one of the most charitable Peers of *England*, namely the good Earl of *Bedford*." After 200 years his lordship seems to have come to life again. It is a pity that he died twice.—*Rev. J. G. Wood.*

Sagacity of Cows.—A very singular instance of sagacity in a cow came under my observation during this week, and under circumstances which leave no doubt of its truth. The following paragraph, clipped from *The Northern Whig* of 16th January, is from the pen of the newspaper reporter present at the hearing of the case "in court." "Anecdotes of dogs rescuing children or defending their master from the attacks of robbers are common, but it is not often that a cow figures in such cases. At the Petty Sessions on Thursday, however, a circumstance was brought to light which goes to show that a cow can at least sympathize with an ill-used woman, and protect her from the violence of a wife-beater. A farmer had been summoned for beating and abusing his wife, and it transpired in evidence that on one of the many occasions when the husband was abusing his wife, it was in a field, in which were some cows, the property of the combatants. One of the animals was a pet of the woman, and when the husband twisted his hand in the wife's hair, tore her clothes, pulled her to the ground, and was about to inflict severer punishment, this cow came charging up the field to the rescue of her mistress, and, assuming an attitude of defence, protected the woman for that time, at any rate, from the fury of the wife-beater. This cow may be again useful to this woman." I may be allowed to go a little into detail, as I was acting professionally for Mrs. F——, the wife referred to. When the cow came up and "presented arms" at the husband, he retreated, and the woman struggled to her feet, and supported herself by leaning on the flank of the cow until she had recovered sufficiently from her shock to be able to run away. The cow during all this time, she assured me, stood still and prevented the husband from renewing the attack. It is but fair to say that the cow "never could bear" the husband. The greater part of the above particulars came out in evidence in the case, and were sworn to by Mrs. F——. The remainder was told to me as her advocate, but were not necessarily elicited. Have any of your readers ever heard of a similar instance of such conduct on the part of cows? We do not consider cows, as a rule, capable of displaying much intellectual power. It might be interesting to the readers of Science-Gossip to hear some well-authenticated anecdotes from your correspondents as to the reasoning powers of these animals.— *C. C. Russell, Newtownards.*

The Name "Tray" as applied to Dogs.—Is it not probable that this name is a corruption or shortening of the name "Terry"? The transition is easy. Mr. A has a dog Terry. His children as they grow up call it Tray, and this name is appropriated by the household in speaking to the children; and ultimately the dog is called by no other. Other families call their little dog by the same name. This seems to me more natural than looking into the German, Saxon, Sanscrit, or any other foreign tongue, for the derivation of the word.—*C. C. R.*

Differences in the Colour of Eyes of Animals.—Numerous examples of this have been recorded in Science-Gossip lately. I believe it to be the rule, not the exception, that the sheep-dog is "ringel-eyed," as it is called here, *i.e.* has the iris of one eye of a different colour from that of the other. I know of two instances in men where this phenomenon existed. Singularly enough, both of these were Presbyterian clergymen in Belfast. One is in full vigour, and hard at work; the other died some few years ago, over eighty years of age.—*C. C. R.*

Fern Owl.—In the woodcut, fig. 2, illustrating the paper on the Fern Owl, in the January number of Science Gossip, the comb-like structure at the inner edge of the claw is imperfectly represented. A better idea of it may be formed by taking two or three types of the 13th letter of the alphabet (italic) *mmm*, and joining them together. But the strokes must be supposed to be somewhat opened, and a little curved.—*R. G.*

Sparrow *v.* Mouse.—In the summer of 1873, when taking a walk on Hampstead Heath, just at the top of the Middle Heath road, I saw a sparrow dashing after something in the road with the utmost fury. The object of pursuit rushed to and fro, trying vainly to escape from its pursuer. The sparrow at last discovered me, and flew off, when, taking up the chase to see what the other object was, I found that it was an unfortunate mouse. I should like to know what could have caused this conduct on the part of the cock-sparrow?—*B. W. Woodward.*

Sudden Appearance of Plants.—On this curious occasional circumstance, I wish to note that about seven years ago, visiting a Kentish wood, about a mile from Greenhithe, in a space which had just been cleared of the underwood, I found an abundant growth of *Digitalis purpurea*, though it had not been visible there when I had been at the same place a year or two before. This year, examining the spot, I find no trace of the plant, which has seemingly died off as rapidly as it sprung up.—*J. R. S. C.*

Superstition regarding the Hawthorn.—In Kent, there is still current the belief that it is an ill omen to pick and bring indoors the flowering sprays of the above. Some persons say the death of one of the family is likely to ensue.—*J. R. S. C.*

White Worms in Plant-saucers (p. 191, last vol.).—These creatures, noted by "W. D.," I have also seen under the like circumstances, but never brought them to maturity, though I suspect that some, if not all, of them are aquatic larvæ of a minute fly of the *Dipterous* order, which thrive under those peculiar conditions. I have noticed a small fly allied to the gnat resting on flower-pots. Several of these dipterous larvæ are worm-like.—*J. R. S. C.*

The Early-history of the Death's-head.—I venture to submit to the numerous readers of Science-Gossip a query which an editor of an entomological journal acknowledges is beyond him. What was the food of the larvæ (supposing the species then British), ere the potato was introduced by Raleigh? The difficulty is to discover any allusions to the insect—if such there are—in early English books on natural history.—*J. R. S. C.*

Preserving Algæ.—I should feel extremely obliged by you or any reader telling me of any fluid in which I could preserve algæ (marine) until I had time to mount them. I often get some, but their condition spoils before they are all ready. I should also like to send some fresh to friends living in inland places by post, but they spoil on the way.—*T. McGann.*

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.

J. L. J.—We cannot say whether "Greenfinches, Bullfinches, Yellowammers, Blackbirds, and Thrushes are good to eat," as we have never tried them, and more, we should be very sorry to sacrifice so much music and cheerfulness to a mouthful of doubtful food.

A. W. W.—Chloride of sodium was undoubtedly meant.

JOHN CAIRNS.—The plant is the Ploughman's Spikenard (*Inula conyza*).

E. V.—Get Nicholson's "Elementary Zoology," price 2s. 6d., or "Half-Hours at the Seaside" (London: Hardwicke), price 4s.

W. H. C.—The mischief in your aquarium may be due to the Portland cement, which, you say, covers the bottom.—W. H. P.

MISS FISHER.—The foreign mosses sent to be named have been duly forwarded, and their names will be sent to you as soon as possible.

A. B.—1. *Pleuridium subulatum*; 2. *Leskea polycarpa*; 3. *Pylaiea polyantha*; 4. *Hypnum albicans*; 5. *H. irriguum*; 6. *H. chrysophyllum*.—R. B.

R. C. FISHER.—Your specimen is an arachnid, and evidently belongs to the family of *Notaspidea*. Plunge it for a moment in hot water, and then mount it in glycerine.

M. HOWELL, jun.—The flower is *Jasminum nudiflorum*. It belongs to the natural order Jasmineæ.

ZEALOUS SUPPORTER.—Your valuable hint shall be attended to.

H. G. WEBB.—You had best write to some well-known London naturalist for prices, &c., and kind of tools for preparing birds' eggs. We should think any of them could oblige you. The figures given in the article on "Collecting and Preserving Birds' Eggs" were done with a view to students having them made for themselves.

M. SMITH.—Your specimens were all detached when they came to hand, so that we could not assign any of them to the numbers.

W. PULLINGER.—Your fungus seems to be *Didymium nigripes*. See Cook's "Handbook of British Fungi," vol. i. p. 386.

S. H. inquires the best method of preserving spiders. Perhaps some of our readers can give him tolerably full details of the process.

J. E. B.—You cannot do better than procure Professor Balfour's large "Manual of Botany." Dr. R. Brown's "Manual of Botany, Anatomical and Physiological" (London: W. Blackwood), is an excellent work, but it does not deal with the classification of plants; the former work does.

H. L. JONES.—Stark's "British Mosses," published by L. Reeve, may be purchased for 7s. 6d.; a second-hand copy for even less.

MOSSES.—We have received several batches of mosses, whose names must stand over till next number.

J. S.—One of your supposed Hepaticæ is a lichen. Get the "British Hepaticæ," published by Hardwicke, 192, Piccadilly, price only fourpence. It contains figures of all the species.

T. PLUES.—Your specimen is the common sulphite of iron. It can always be told from sulphite of copper by its greater hardness, if tested by a common pocket-knife.

W. ADAMS.—The lichen is *Parmelia sulphurea*.

T. A. R.—Get the new edition of Lankester's "Half-Hours with the Microscope." (London: Hardwicke.)

EXCHANGES.

NOTICE.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

FOR Crystals of Tantonin for polariscope, send stamped directed envelope to W. H. Gomm, Somerton, Taunton.

BULL'S-EYE Condenser Telescope, good Slides, &c., for Foraminiferous Sand from Dog's Bay and twenty other places (separate), Algæ in fruit, named for micro-mounting, or displayed on paper for herbarium, Diatoms, Zoophytes, Polyzoa, &c.; Spores of *Trichomanes radicans*, Parasites, Ferns, and Rockwork Plants (living), &c.—T. McGann, Burrin, Ireland.

"HOGG on the Microscope," and six Slides offered for "Carpenter on the Microscope."—H. B. Thomas, Boston, Lincolnshire.

W. G. PIPER wishes to exchange specimens of Fruit and Seeds, with their Products used in Medicine and the Arts, and any Fruit or Seed of interest.

AUSTRALIAN Sheep's Wool for other objects, unmounted.—S. W. F., Ham House, Wellington, Somersetshire.

WANTED, Nos. 43, 73, 79 (*brachycarpa*), 91, 92*b*, 135 (*stagnira*), 136*a*, *b*, *c*, 130*b*, 154, 155*b*, 197*a*, *b*, *c*, 240*b*, 256, 322*b*, 376, 377*b*, 378*b*, 491, 521, 650, 651, 686, 693, 724 (*vera*), 741, 742, 749, 823, 941*b*, 956, 1049, 1050, 1074, 1075, 1076, 1077, 1089, 1100, 1158, 1226, 1233*b*, 1334. Offered in exchange, Nos. 113, 124, 135 (*lastra*), 180*b*, 248*b*, 251*b*, 252, 270, 277*x*, 278*x*, 447, 489*b*, 552, 594*b*, 655, 690*c*, 691, 694, 723, 731, 776, 794, 817, 874, 1080, 1085*b*, 1086*x*, 1166 (*I. pygmæus*), 1187, 1238*x*, 6th edition London Catalogue.—James Cunnack, Helston, Cornwalll.

FOR mounted *Orthosira arenaria*, send mounted or good unmounted objects to I. H. B., 3, Clifton-place, Sauchiehall-street, Glasgow.

SECTION of Carboniferous Limestone, mounted, showing vegetable structure (by reflected light), for any other well-mounted Object (Geological subject preferred).—E. Lovett, Holly Mount, Croydon.

CRAG FOSSILS for complete specimen of Venus's Flower-basket.—T. J., 192, Piccadilly, London.

URTICATING hairs of Indian Cowitch, mounted, and many others.—Send list to C. C. Underwood, 25, Gloucester-place, Portman-square, W.

RARE Birds' Eggs, for others not in collection. Wanted, Minerals and Insects.—J. T. T. Reed, Ryhope, Sunderland.

CARBONIFEROUS Fish, Foraminifera, Corals, and Brachiopoda, for good mounted Micro-sections of Fossil Fish, Reptiles, and Mammals.—J. Howster, Richmond, York.

LOWER Silurian Graptolites for Glass-rope Sponges, Venus Flower-baskets, or tropical *Echinodermata*.—Address, Petra, 192, Piccadilly, London.

BOOKS, &c. RECEIVED.

"Monthly Microscopical Journal." February.

"Journal of Applied Science." February.

"Animal World." February.

"Land and Water." February.

"Les Mondes." February.

"The Colonies." February.

"Insects Abroad." By the Rev. J. G. Wood. London: Longmans & Co.

"Report of Microscopical Investigations on Cholera." By Dr. T. R. Lewis and Dr. D. D. Cunningham. Calcutta.

"Nematode Hæmatozoa." By Dr. T. T. Lewis.

"Annales de la Société Entomologique de Belgique, 1874."

"Bird Life." By Dr. Brehm. London: Van Voorst.

CORRESPONDENCE RECEIVED UP TO 12TH ULT. FROM:—J. B. B.—F. K.—J. R. S.'C.—W. H. W.—R. H. W.—Capt. L.—Col. H.—H. S.—J. H.—R. G.—W. L.—J. C.—T. B.—A. D. P. J. W. H.—S. W. F.—H. G. W.—J. C.—J. W. L.—D. H. B.—C. I. M.—A. W.—T. W. W.—M. V. S.—M. S.—A. B.—J. S. H.—J. B. W.—S. W.—P. Q. K.—H. B. T.—R. C. F.—A. S.—J. W. G.—J. B.—W. H. G.—T. B. W.—M. W.—T. McG.—A. B.—E. V.—W. H. P.—W. P.—A. M.—J. H., jun.—W. R. T.—C. C. U.—W. H.—T. B.—T. H. A.—W. W. P. H.—W. O. S.—S. H.—W. M.—T. E. B.—T. E. J.—C. K.—E. L.—J. T. T. R.—H. J.—J. S.—S. M.—J. W.—W. S.—G. H. K., &c.

DOUBLE STAINING OF WOOD AND OTHER VEGETABLE SECTIONS.

By GEORGE D. BEATTY, M.D.

IN my paper on Vegetable Staining in the January number of this Journal, I said the only aniline colour I had used with success for staining leaves was the blue. The statement was based on the fact that this colour did not come out when the leaves were put into absolute alcohol, or into oil of cloves, provided certain brands of these chemicals were used.

I have lately discovered that benzole fixes the anilines when they are used in staining vegetable and animal tissues. It not only instantly fixes any aniline colour in vegetable tissues, but also renders them as transparent as oil of cloves.

Finding that benzole possessed this property, led me to try double staining upon sections of leaves and sections of wood. The results have proved highly satisfactory. I have found the following processes successful:—A section, say of wood, being prepared for dyeing, is put for five or ten minutes in an alcoholic solution of "Roseine Pure" (Magenta), one-eighth or one-quarter of a grain to the ounce. From this it is removed to a solution of "Nicholson's Soluble Blue Pure," one half-grain to the ounce of alcohol, acidulated with one drop of nitric acid. In this it should be kept for thirty or ninety *seconds*, rarely longer. It should be frequently removed with forceps during this period, and held to the light for examination, so that the moment for final removal and putting into benzole be not missed. After a little practice the eye will accurately determine the time for removal.

Before placing the object in benzole it is well to hold it in the forceps for a few seconds, letting the end touch some clean surface, that the dye may drip off, and the object may become partially dry. By doing this, fewer particles of insoluble dye rise to the surface of the benzole, in which the brushing is done to remove foreign matter. The object should then be put into clean benzole. In this it may be examined under the glass. If it is found that it has been kept in the blue too short a time, it should be thoroughly dried, and, after dipping in alcohol, be returned to that dye. If a section of leaf or other soft tissue be under treatment, it should be put in turpentine or oil of *juniper*, as they do not contract so much as benzole.

When hæmatoxylon is used instead of magenta, it is followed by the blue as just described. As neither of these dyes comes out in alcohol or in oil of cloves, the section may be kept in the former for a short time before placing in the latter.

The hæmatoxylon dye I prefer, is prepared by triturating in a mortar for about ten minutes two drachms of ground Campeachy wood with one ounce of absolute alcohol, setting it aside for twelve hours, well covered, triturating again and filtering. Ten drops of this are added to forty drops of a solution of alum; twenty grains to the ounce of water. After one hour the mixture is filtered.

Into this the section, previously soaked in alum-water, is placed for two or three hours, or until dyed of a moderately dark shade. When dyed of the depth of shade desired, which is determined by dipping it in alum-water, the section is successively washed for a few minutes each, in alum-water, pure water and fifty per cent. alcohol. Finally it is put in pure alcohol until transferred to the blue.

Carmine and aniline blue produce marked stainings, but they are rather glaring to the eye under the glass. I use an ammoniacal solution of the former, double the strength of Beale's, substituting water for glycerine. In this a section is kept for several hours. On removal it should be dipped in water, and then put for a few minutes in alcohol acidulated with two per cent. cf nitric acid; then in pure alcohol; then in the half-grain blue solution before spoken of, from which it should be removed to alcohol; then to oil of cloves. Much colour will be lost in the acid alcohol. The acid is to neutralize the ammonia, which is inimical to aniline blue. Magenta aniline or hæmatoxylon may be used with green instead of blue aniline. The brand of green I prefer is the iodine brand, one grain to the ounce of alcohol.

Double stainings of sections of leaves in which red is first used, have the spiral vesesls stained this colour, other parts being purple or blue. Radial and tangential sections of wood have the longitudinal woody fibres red, and other parts purple or blue.

This selection of colour is, I think, due to the fact that spiral vessels and woody fibres take up more red than other parts, and are slower in parting with it. The blue, therefore, seems first to overcome the red in parts where there is less of it. It will entirely overcome the red if sufficient time be given.

If the blue be used before the magenta aniline, the selection of colour is reversed.

I would here call special attention to the importance of examining these stainings at night, as the red in them has a trace of blue in it which does not show at that time, but comes out so decidedly by daylight, as to change, even spoil, the appearance of the specimen.

I think they should be mounted in Canada balsam, softened with benzole, as the presence of the latter may be beneficial in preserving its magenta.

I would offer a few words upon section-cutting, and upon preparing sections for dyeing.

To cut a thick leaf, place a bit of it between two pieces of potato or turnip, and tie with a string. Cuts may be made along the midrib, or across it, including a portion of leaf on either side, or through several veins. Fine shavings of wood may be used, or pieces rubbed down on hones.

Sections of leaves may be decoloured for staining by placing for some time in alcohol; but I would recommend the use of Labarraque's solution of chlorinated soda, for a few hours after the alcohol. Especially do I recommend the Labarraque for all kinds of wood. In twelve hours wood is generally bleached; too long a residence in it will, however, often cause it to fall in pieces.

After removing from the soda, wash through a period of twelve or eighteen hours in half a dozen waters, the third of which may be acidulated with about ten drops of nitric acid to the ounce, which acid must be washed out. Next put in alcohol, in which sections and also leaves may be kept indefinitely, ready for dyeing.

Before closing this I would add a few suggestions concerning leaves not contained in my January article.

Magenta, when used for them, should be of the strength of one-eighth or one-quarter of a grain to the ounce of alcohol, and purples and iodine-green two or three times as strong. These anilines are inferior to the blue in bringing out all the anatomical parts of a leaf, including the beautiful crystals so often met with. On removal from the dye, leaves should be thoroughly brushed with camel-hair pencils.

One week, instead of forty-eight hours, is frequently required to effect the decoloration of large leaves in chlorinated soda, even when they are cut into several pieces, which is advisable.

Mr. L. R. Peet, of this city, whose stainings in aniline are unsurpassed for beauty, thinks better results are attained by commencing with a weak dye, say from one-twentieth to one-twelfth of a grain, and slowly increasing the strength of the dye, at intervals of from one to three hours, until the required hue is obtained. This process certainly guards against too deep staining, and may give a finer tone to leaves under the glass.

Baltimore, U.S.A.

OUR JACK.

HAVE you ever kept a pet magpie? If not, you ought by all means to get one; for of all the amusing, interesting, impudent specimens of the bird tribe, it is the greatest. We have one, which we have reared from the nest, and most fully has it repaid any small amount of trouble expended upon it. One day early in May last year, one of our brothers brought in from a distant fir plantation what looked like two awkward-looking animated dumpy balls of black and white feathers. On looking closer, these were discovered to be in possession of a beak and eyes each, and pronounced to be young magpies. They were immediately adopted by the family, and endowed with the well-known names of Jack and Jill. Of their babyhood there is not much to chronicle, except the eagerness with which they gulped down spoonfuls of bread and milk every few hours, and the obstinacy with which they refused to perch at night, usually preferring to sit upon each other's back, being warmer for the feet than a cold perch. As, however, both could not have the most comfortable position, there was generally a scuffle about bedtime, in which the larger of the two most often gained the ascendancy. They soon grew too large for their cage, and then the question arose what to do with them next—where to place them? At the top of our house, just under the slates, is a large unfinished attic. Looking in from the door you see nothing but beams and laths and plaster, and uncompleted rough tops of walls, and a small flight of steps leading out on to the roof. This was voted a capital roomy place for Jack and Jill, and accordingly they were carried up and there installed, soon discarding their old cage. Here they grew and prospered, and in a week or two began to show their natural propensity, that of hiding. If supplied with more food than they had appetite for at the moment, off they would run with a beakful of worms or meat or rice pudding, or anything it might chance to be, and thrust it into some hole or corner, returning quickly for more. How these dainties tasted after being well mixed with dust and mortar, I have no idea; but it was well for us when the birds chose such places, for when it came to having a beakful of ripe juicy red currants or soft rice pudding thrust slyly down the back of our neck or in the folds of our dress, it was not so pleasant. A very favourite trick was perching on the top of our head and flying off with any smart-coloured bow of ribbon which might adorn it. If not immediately rescued,—rather a difficult matter, by the way, they are so quick,—there was no knowing when or in what condition it would be recovered. It was extremely amusing to see them with two young kittens. We endeavoured to make them all live together in a "happy family, feed at the same dish," &c.; but the birds would not allow this, for no sooner did a kitten begin to enjoy its dinner, than the jealous magpie would steal round and slyly pull poor pussy's tail, with such roughness as to make her spit and growl, and finally another attack would send her vanquished off the field with every hair erect. Poor Jill's love of hiding soon brought her to a sad end. She was missing one day, and after a long search was discovered lifeless under a board. It was evident that in order to effectually hide some dainty mouthful she had pushed herself so far under the board as to be unable to get out again, and so died. Jack did not seem to mourn the loss of his Jill so deeply as he might have done, we thought. Indeed, he is rather the gainer than otherwise, as he gets now all the attentions formerly bestowed on the two. He has already learnt to say "Jack!" "Poor Jacky!" "Oh, Poor Jack," and is so tame that he will feed out of our hand or perch on our shoulder. He is very sly, too, and you must beware of a sly poke or severe dig with his sharp beak in an unguarded moment. His great delight is in rushing at any unprotected ankles, and if prevented by a long dress in front he runs round to try to attack from behind. He is dreadfully excited at the sight of a pair of bright-coloured slippers, such as blue or red. The former colour is his especial aversion, and a dress in bright blue makes him scream loudly. As for food, Jack will eat almost anything,—cooked meats, pastry, and toffee are great treats. He is so fond of them that he does not care to hide them, but swallows them at once. He requires very little attention, and that he receives most gratefully—showing so much attachmemt, or at least partiality, to particular persons, that we are sometimes strongly inclined to disbelieve the saying that birds show no affection. He delights in a bath of fresh water every day, but looks a most disreputable object after it. No one seeing him at that moment would imagine him the beautiful bird that he appears half an hour afterwards, in his glossy white and black raiment, the latter showing all the colours of the rainbow on their shining surfaces. With all his faults and good qualities he has endeared himself with one and all, and very sorry we should be to lose our pet "Jack."—*C. H. R. Gwastad.*

OUR BRITISH FRITILLARIES.

THE British Fritillaries form a small and very natural group of our small quota of butterflies. Alike in markings and general structure, though varying considerably in size, their habits show some striking resemblances, and some strange differences. Several of the species are sure to be amongst those which stimulate the young entomologist in his earlier and eager chases after these insects, more literally even than many others, the "flowers of the air." The larger Fritillaries are mostly difficult to capture, as they fly rapidly, and can rise to a good height in the air. They do not, however, travel for miles in the air, as the Vanessas are known to do, and other strong-winged butterflies. The smaller Fritillaries, though not so easily taken as are the Whites, and some of the Meadow butterflies, are nevertheless rather languid on the wing. Both in the case of the large and small species we find that they generally make choice, at the time of their emergence on the wing, of a spot of ground where they congregate, and which has been called their "metropolis." Thus a species will be found in dozens about an opening in a wood, and only stragglers in other parts of the wood. Some entomologists have stated that in woods where a certain species occurs, the metropolis or centring-spot is changed every year. One observer in driving through a park noticed that the three species, designated *Argynnis*, *Adippe*, *Aglaia*, and *Paphia*, were all out on that particular July day, but not mingling with each other; and he fancied that each species had a predilection for its own selected ground, on account of the trees that were growing there, as the plantations varied in the different parts of the park. As to this, we have not as yet sufficient evidence to form decided conclusions about fritillary preferences in the matter of trees and underwood. Very few of us have been fortunate enough to see these three large Fritillaries in the course of an hour. I am inclined to think that the Silver-washed Fritillary (*A. Paphia*) is, at least occasionally, an exception to the rule of centralization, since I have noticed the insect flying indifferently along the "ridings" of a wood, apparently distributed pretty equally there. Many collectors of butterflies find it rather slow work completing their array of the Fritillaries, through the circumstance that their season averages only a week or two; their life being so different from that of the gaudy Peacocks and Tortoiseshells, individuals of which may be seen sporting on the wing at various times from April to September. And even those brisk little fellows, the Coppers and Blues, "show up" at two or three periods in the course of the season.

Fig. 39. Silver-washed Fritillary (*Argynnis Paphia*), upper side, male.

Although the fact is tolerably well known, I may mention that the resemblance borne by these butterflies to the lily, called by old writers the "Fritillary flower," and once esteemed a choice ornament in gardens, led to the appropriation of the name to these butterflies by the earlier entomologists. The wings in all the species bear tesselated spots, more or less distinct. Another partial characteristic is the possession of silvery spots or streaks found in the Fritillaries of the genus *Argynnis*, but lacking in those of the genus *Melitæa*. It is not necessary, however, that I should proceed with any detailed description of species fully represented in popular works on Entomology, and I only purpose to give a few jottings which may illustrate or supplement what has been published about them. Of the group, considered in their larval stage, it is curious to observe that in all, or well-nigh all, the young caterpillars hatch out in the autumn, and feed up in the spring. A doubtful exception is the highly prized "Queen of Spain" (*A. Lathonia*), and there, as the perfect insect has been taken in September, naturalists have conjectured that there must be two kinds; such is a fact in its life history in some continental countries. But here, as Mr. Newman seems to think, the larva, after its winter sleep, comes out late to feed, and then, not entering the pupa state till June or July, we may suppose its emergence as a butterfly about August to be its natural course. The species, though truly British, is so rare that one hesitates to be too positive. That our five species of *Argynnis* should all feed on the plants belonging to the genus *Viola* is singular. The statement of some entomologists, that the larva of *A. Paphia* also eats the nettle or wild raspberry has been seriously doubted, the plants being so very different to the Violaceous order. But, as I have previously pointed out in an entomological journal, the occurrence of *A. Euphrosyne* in places where there are few violets noticeable, or even none at all,

Fig. 40. Small Pearl-bordered Fritillary (*A. Selene*), under side, and upper side.

though the common primrose grows plentifully, allows us to form the suspicion that the latter may be a food-plant of this species of Fritillary. We meet with much difficulty in making out the habits of these larvæ, through their exceeding shyness. Not satisfied with the concealment they may obtain on the plants that form their food, some of them quit the violets, and place themselves on other plants in the neighbourhood.

That splendid insect, the Silver-washed Fritillary (*A. Paphia*), has undergone a sensible decrease in numbers of late years, in all the localities noted for it in the vicinity of London. Indeed, in several places where it once abounded it has disappeared altogether; partly, of course, in consequence of the grubbing-up of the woodlands; but we cannot excuse collectors of insects *in toto*. Probably it may be deemed a fortunate circumstance, that the larvæ of Fritillaries are difficult to find, or otherwise, the larger species, especially, would share the fate of the large Copper Butterfly. In any wood or park of some extent (for the lady *Paphia* rarely or never condescends to take up her abode in a small plantation or copse), throughout England and Ireland, the insect may be seen in July or August, usually most in perfection about the first week in July. To the north of the Tweed few localities are given for

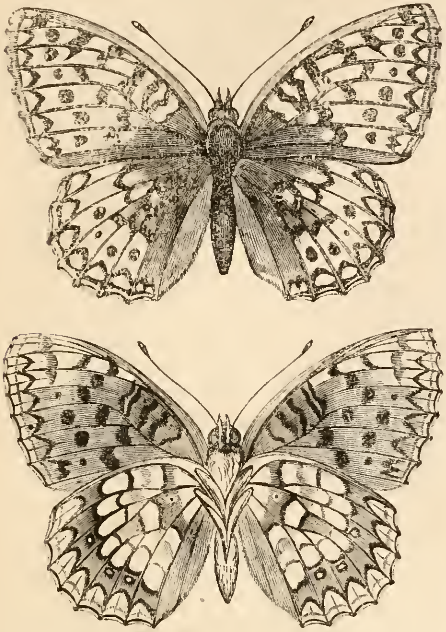


Fig. 41. *Argynnis Niobe*, female, upper and under sides.

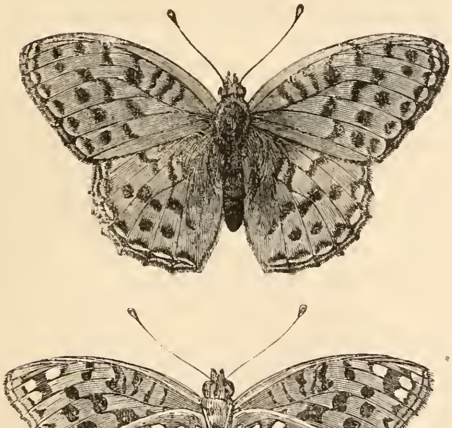


Fig. 42. High Brown Fritillary (*A. Adippe*), male, upper and under sides.

it. Perhaps in England the two places where it may be seen in most profusion are the banks of the Wye and the New Forest. The latter produces a peculiar and constant variety known as *Valezina*, yet not entirely restricted to that forest, though very conspicuous there. The flowers of the bramble and thistle kindly bring these butterflies within reach of the entomologist, yet they do not much favour his making successful captures, a torn net and a fugitive insect being often the result of an impetuous strike. As the name implies, the "Silver-washed" is "conspicuous by the absence" of the spots which adorn others of the genus *Argynnis;* but instead, we have streaks and pencilling of silver.

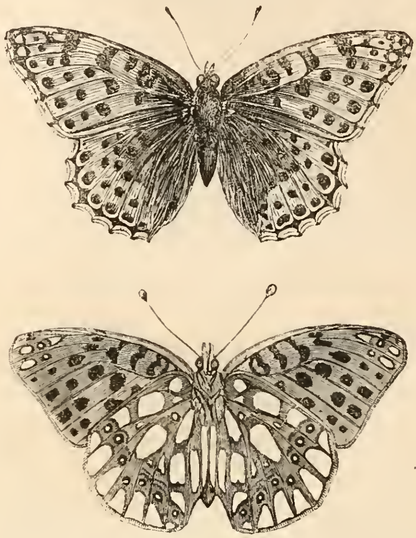


Fig. 43. Queen of Spain Fritillary (*A. Lathonia*), female, upper and under sides.

Fig. 44. Pearl-bordered Fritillary (*A. Euphrosyne*), upper and under sides.

One may class together the two fine insects, *A. Aglaia* and *Adippe*, so much alike that entomologists can scarcely distinguish them. Not much reliance is to be placed on the English epithets "dark green" and "high brown," though a row of *A. Aglaia* may display, taken as a whole, more of a green hue than *A. Adippe* does. Especially is this so with the females, the males being frequently quite as "high brown" as *Adippe*. An exceedingly scarce and beautiful form of *A. Aglaia* has been designated *Charlotta*. This species does not seem so peculiarly attached to woods as are others of its congeners, delighting in extensive downs, and places near the sea-coast. In Scotland it is much more common than *A. Paphia*. I think the High Brown Fritillary

Fig. 45. Greasy Fritillary (*Melitæa Artemis*), upper and under sides.

(*A. Adippe*) is rather a smaller insect, remarkably active on the wing, as is also the preceding, yet not quite so strong in flight. The maritime tastes of *A. Aglaia* are not exhibited by this species, which keeps closer to the woods, though sometimes seen on heaths. By general report, it is a scarcer species than *A. Aglaia*, apparently unknown in Scotland and Ireland, perhaps overlooked through its higher aërial flight. A singular form has been taken, with fulvous, in place of silver spots, on the under side.

Quite a buzz was caused in the entomological world when a specimen, identified afterwards as the Niobe Fritillary (*A. Niobe*), was captured in the New Forest in 1870. It is a butterfly much resembling *A. Adippe*. Last year another sensation was produced by the report that several had been taken in Kent, between Wye and Ashford; and a living individual was forwarded to Mr. Doubleday, and the name verified by him. This is an important addition to the list of British fritillaries; but the incredulous assert that there is still a loophole for a doubt to enter. Even as some persons have planted diamond and gold fields with specimens brought to the spot, in order to lure the unwary, so it has been said, nowadays, with such easy communication to and from the Continent, the importation of fritillaries is no impossible thing. Hence, for precisely the same reason, the records of the captures of "Queens of Spain" are not all to be depended upon, as the temptation to do business with those who are eager for rarities, leads to a traffic in foreign examples of this fritillary, sold with a guarantee that they are British. Our best authorities, while admitting that *A. Lathonia* is a native species, believe that most of the stray examples of the insect that turn up near or on the coast have either been "blown over," or crossed the water on some vessel. At Birch Wood, where a *A. Lathonia* was taken for four or five years in succession, a locality quite inland, we must admit that the species must have bred up in this country. The same conclusion must be come to regarding the individuals taken in a locality near Canterbury by Mr. Parry. Why the species does not get a fair footing with us, is a debatable point; possibly the peculiarity in the habit of the caterpillar, already referred to, is one impediment. On the wing, it might be, perhaps is, mistaken for its relatives, *A. Euphrosyne* and *Selene*.

These common species, which also we will take together, are familiar to the entomologists who visit woods in May and June; and they get a share of admiration from non-entomologists, who may be botanizing, shell-collecting, or at some kindred pursuit, just when the Fritllliaries emerge, and show themselves in parties, small or large. Though *A. Selene* is in the vernacular called the "Small Pearl-bordered," in size the two insects very closely approximate, and the best distinction lies in the silver spots beneath the hind wings, which are few in *A. Euphrosyne* and numerous in *A. Selene*. The two species hardly ever appear contemporaneously from the pupa state: the flight of the former is usually in the third or fourth week of May; the latter takes to the wing in June. Of late years *A. Selene* has been less abundant in various localities where it was once found in profusion; and the almost unceasing attacks made upon *A. Euphrosyne* in woods approximating to large towns have tended to its diminution in a degree. Though both insects are found in Scotland, no Irish specimens have been reported. Dark, or "black" examples of *A. Euphrosyne* are sometimes caught.

The three *Melitæas* are small butterflies, with the same style of markings on the upper surface, but having beneath no silver spots or dashes, but a tracing of some intricacy, and very pleasing to the eye. While in the larval stage they are as gregarious as in the imago state, the food-plant of one, *M. Artemis*, being the Devil's bit scabious, the others resorting to different species of plantain. The commoner of the three species is that just named, delighting in damp meadows, and, though numerous, often confined to a space of a few hundred yards, seldom flying with any celerity even in sunshine, while in dull weather the butterflies may be caught in the fingers. A friendly correspondent in Ireland, Mr. Brakey, gave me a graphic account of the extraordinary profusion in which *M. Artemis* appeared in an instance under his observation. The next year very few were seen in the same spot. According to the statements of Mr. Coleman and others, the Greasy Fritillary was formerly taken as near to London as Hornsey and West Wickham: I doubt if it is now to be included in the number of our metropolitan insects. Even for the next species, *M. Athalia*, Caen Wood has been cited as an old locality, and it may have bred freely on the heaths north of London ere the builders made those extensive encroachments on the "ruralities" in North Middlesex. This is also a species sure to be plentiful where it does occur; though it seems restricted to the South of England, being nearly unknown in the north. Devonshire is one of the favoured haunts of the insect, where Mr. Bignell has taken larvæ and imagos in several localities. Woods, where the herbage is stunted, suit the habits of the species as well as more open ground. Still more limited in range is the "Glanville" (*M. Cinxia*), so immediately associated in the recollections of many collectors with the Undercliff in the Isle of Wight, a locality rich in natural history treasures. Mr. Dale took the species in the New Forest, and one or two other localities have been cited. I apprehend the references in some books to Dartford and Birch Wood in Kent must be esteemed to be of the nature of myths. J. R. S. CLIFFORD.

NOTES ON THE DIPTERA.

APRIL:—HUMBLE-BEE FLIES.

IS it not a fact, that whereas all amateur entomologists give more or less attention to the Lepidoptera, the Coleoptera, or even the Hymenoptera, the other orders of insects remain too little noticed? Yet there are many classes besides which will as fully repay study as those above mentioned.

Having given our attention more especially to the Diptera, we have found them pre-eminently interesting, and we think their anatomy, as revealed by the microscope, can hardly be equalled in beauty by other insects; while as to their habits, they are at least as remarkable as those of other families. Of their transformations too little is as yet known; so that this point calls for special attention, and perhaps a few random notes on one or two of the most interesting families may induce others to give closer attention to this order, which they usually neglect.

The first sunny weather of April will bring out the *Bombylii*, or Humble-bee Flies. They may be seen in open woods and lanes, and occasionally in gardens, throughout this month and the early part of May. They are easily overlooked, because of their resemblance to humble-bees; but their flight is characteristic, hovering, as they do, with uncertain motion, over the ground, or darting about most rapidly, when disturbed by the slightest sound. Their hum is not at all like that of the humble-bees, but is shrill and faint, rather like the upper note of a violin. Their ordinary food is the honey of flowers; but, judging from their motions when flying, they seem sometimes to feed on small insects, as their relations the *Empidæ*, and others, do.

They are particularly aggravating insects to catch, for their flight is exceedingly swift, and they have a way of keeping to one place, just exactly out of one's reach, that is very tantalizing.

According to Walker's classification of the British Diptera, they are the seventh family of the division Brachycera, and are not far removed from the *Asilidæ* (or hornet flies) on the one side, and the *Empidæ* on the other. They are characterized by having broad and flat bodies, the thorax being broader than the head, and the abdomen broader than the thorax. The whole body and the head (except the eyes) are covered with a velvety down, consisting of long straight hairs, attached to the fly in so slight a manner as to be as easily rubbed off by incautious handling as the scales of butterflies. It is this down that gives them their great resemblance to humble-bees, for their colours are nearly the same, although somewhat differently arranged.

Even among the many peculiar mouths of the Diptera, the mouths of Humble-bee Flies are remarkable. They stand out straight from the head, in the same line with the body, and not at right angles to it, as in most diptera. Their great length enables the flies to extract honey from the flowers of anemones, primroses, and ground ivy, which are their common food-plants, without alighting; and indeed, considering the depth of the corollas of the two latter flowers, a short tongue would be of little use to procure their honey.

Fig. 50 is a diagram of the mouth of *Bombylius major* × 12 diams.; and fig. 51 shows the tip of the labium more highly magnified. The use of some of the parts we can only conjecture, but their description is as follows:—First in importance comes the labium, or lower lip (*la*), which forms a kind of trough, wherein lie the two maxillæ (*mx*) and the lingua or tongue (*l*), and which is closed above by the labrum, or upper lip (*lbr*): this last tapers to an extremely fine point, and perhaps performs the office of a lancet. The labium is shown fully extended; but when not in use, the upper portion is partially withdrawn inside the part lying between the letters *a a*. Between its two lobes is a most peculiar organ (figs. 50 and 51, *lt*), which we have called a lancet; but its structure seems ill adapted for piercing. The labium is furnished with two pairs of tendons; one pair of which, attached to the two little fulcra (*f*), separate the lobes; while the other pair, inserted halfway down the said lobes at *t*, bring them together again. We cannot find out the exact point from which these tendons arise, for they appear to fade away gradually. Down the labium run, as is usual in all diptera, two tracheæ, each of which is considerably branched. The capillary channels (sometimes called "false tracheæ") which serve to gather up honey, pollen, &c., are, in this genus, limited to three on each lobe of the labium: this is very few in comparison with some flies; but their

Fig. 46. *Bombylius medius*, natural size.

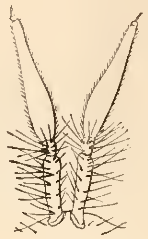


Fig. 47. Antennæ of *B. major*, × 12 dia.

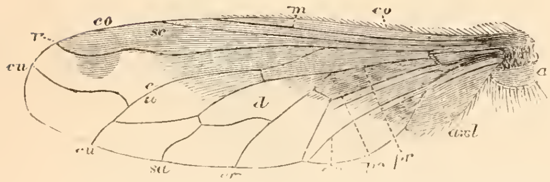


Fig. 48. Wing of *B. major*. The names of the veins are:—*co*, costal; *sc*, sub-costal; *m*, mediastinal; *r*, radial; *cu, cu*, cubital; *sa*, subapical; *em*, externo-medial; *pr*, præ-brachial; *po*, post-brachial; *an*, anal; *d*, discoidal areolet; *axl*, axillary lobe; *al*, the alula.

large size compensates for their small number. The maxillæ (*mx*) and the lingua (*l*) present no specially interesting features, save that the latter is hollow, instead of being merely a flat blade, as it is in most flies. The labial palpi, which are to be found in the mouths of flies of some families, are absent in the *Bombylii*, but the maxillary palpi (*mp*), which are shown in the figure, are present in every dipterous insect.

The antennæ of Humble-bee Flies (see fig. 47) have six joints. The first and second are covered with long hairs; the third joint is very long,—it is covered with short hairs; the little pits on the surface, formerly supposed to be the seat of hearing, but now more generally believed to be the organs of smell, are small, but numerous. The last three joints are small, the fourth is distinct, but the fifth and sixth run one into the other.

The legs are long and very slender. Fig. 49 represents a foot: the pads are very small, but the hooks are of moderate length; thus indicating that the fly does not often walk on flat surfaces.

The wings of Bombylii are long and powerful. The names of the veins may be learnt from fig. 48; and we would remark in passing, that as the Diptera are in a great measure classified according to the venation of their wings, it is always important to note the characteristics of the wing of a strange species, and to make a drawing of it. The spaces between the veins are called areolets; and the central one

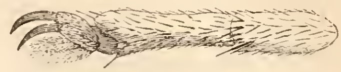


Fig. 49. Foot of *B. major*, × 45.

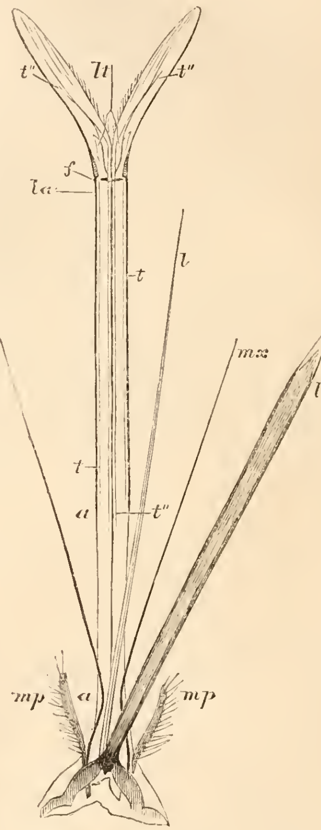


Fig. 50. Mouth of *Bombylius major*, × 12: *la*, labium; *lbr*, labrum; *l*, lingua; *mx*, maxillæ; *mp*, maxillary palpi; *lt*, lancet; *t*, opening tendons; *t''*, closing tendons; *f*, fulcrum.

(*d*) named "discoidal," should always be particularly noticed, because it varies considerably both in shape and position, and a glance at it will often give a clue to the family and genus of an unknown insect. The secondary wings, or halteres, of humble-bee flies are small, and hidden by the down which clothes the body of the insect.

We believe that in their larval and pupal stages Bombylii are parasitic on humble-bees, the parent

Bombylius laying her eggs in the nests of *Bombus terrestris* and other species; but very little is known of their life-history, further observations being needed; aud we should be glad to hear if any one could throw further light on the subject.

The following are the chief characteristics of two of the four species.

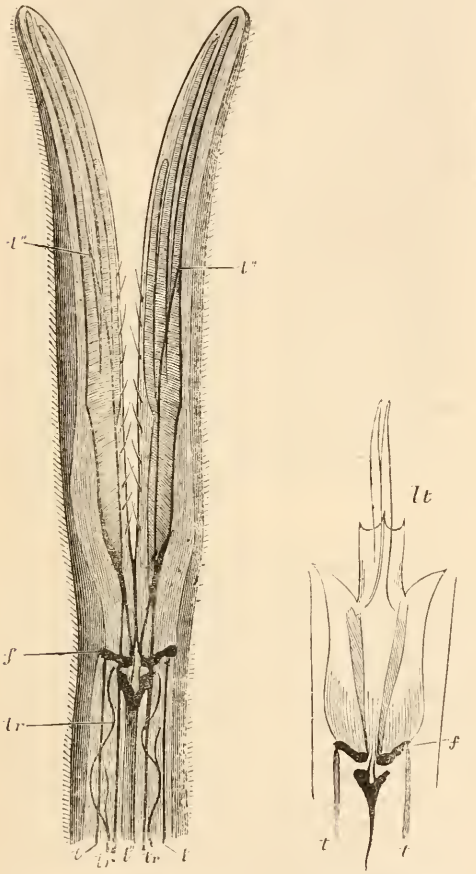


Fig. 51. Tip of labium, × 35; *t*, opening tendons; *t''*, closing tendons; *f*, fulcrum; *tr*, tracheæ; *lt*, lancet, removed and drawn separately. The lettering is the same in all the figures of the tongue.

Bombylius major.—Leugth, in parts of au inch, $\frac{6}{20}$ to $\frac{10}{20}$; breadth $1\frac{1}{20}$. The body is black, clothed with tawny and black hairs above, and white and black beneath. The brown patches on the wing, shown in fig. 3, are constaut in shape; and by the wings alone a specimen can be identified, which is fortunate, for it is otherwise a very variable species, both in size and colour. It is generally distributed, and tolerably common.

B. medius.—We have endeavoured to represent this species by fig. 46, in order that the reader may get a general idea of what a humble-bee fly is. Although called "medius," it is a larger insect than the former, and much like it; but it may readily be distinguished by the wings, which, instead of patches, have fourteen brown spots, mostly situate at the junction of the veins. Its length is about $\frac{11}{20}$ of an inch, exclusive of hairs and antennæ, which add $\frac{3}{20}$ more. Breadth from the tip of one wing to the tip of the other $1\frac{2}{20}$ inch, and the length of its tongue, when fully extended as in fig. 50, is about $\frac{13}{20}$, being the longest dipterous tongue we know. As shown in fig. 46, the fly has a white line dowu the middle of the abdomen.

There are two other species, both rare, which we have never been fortunate enough to catch. There is no danger of confounding them with either of the species above described, for, besides being much smaller insects, the wings of both are without either patches or spots, and their tongues are shorter thau their bodies.

Flies intended for pinning out—*i.e.* for the cabinet—should be killed with a cyanide-bottle, or iu any other way which does not injure their appearance; those which are wanted for the microscope may be killed by immersion in methylated spirit, in which they may be kept any length of time without injury to their chitonous portions; but if it be required to make dissections of their "interior arrangements," it is better to use the former method.

In naming the species, we have followed the arrangement of Walker iu his "Insecta Britannica"; but some authors reverse the names of *B. major* and *B. medius*, which, considering the comparative sizes of the two flies, seems a sensible method; but then, you know, Walker is "the authority."

FRANK J. ALLEN AND H. M. J. UNDERHILL.

THE SONGS OF BIRDS.

DURING the spring and summer of the past year, our out-door studies in zoology were confined to certain features of bird-life more particularly; and prominent among these various phases of birds' existence, was that of singing, and its relation to the other utterances of birds; for before the close of the summer, we became fully convinced that a bird's song bore just such relationship to its various chirps, twitters, and calls, that singing with mankind bears to his ordinary conversation.

Early in the morning of a bright May day, passing, on our look-out for birds, along some woody hill-side, glistening with dew, aud glorious in floral decoration, we are stopped by a loud chirp! In an instant a hundred melodious voices are hushed, and not until we have remained quiet several moments, is the concert resumed; then, the bird that gave the alarm-cry seeks some more elevated perch, and, with head erect, our wood-thrush, again takes up those woudrous strains of melody, beyond the power of our language to describe. Another and another songster join in the chorus, and again the woods ring with the united voices of thrushes, wrens, sparrows, and warblers beyond count.

It may be objected, at the very outset, that all are not singing-birds, and the fact of such "non-singing" birds disposes effectually of the theory. "Whoever heard an owl sing?" is asked in derision. My good friend, do you call the shrill, cacophonous shouts of savages singing? Yet we know that to our Indians their weird cries and ceaseless drumming are as melodious to them as "La Traviata," "Faust," or "Il Trovatore" to yourself. We are met with a mere assertion then, very probably, that there are birds with songs; for with every bird there is a very considerable range of utterance, divisible into cries or expressions of various kinds; of course, of different meanings. Some of the low, monotonous tones of brooding birds are more probably uttered for their soothing effect upon themselves, their mates, and young, than for any other purpose.

A bird can be rightly understood but by a bird, and a naturalist must spend years in patient watching day after day, and by his constant presence become familiar to the birds, before he can witness a tithe of many acts on their parts, which go to prove them nearer to reasoning beings than mankind generally suppose.

Our space does not admit of giving all the details that we have jotted down during the past seven months, or anything more than an occasional reference to our many notes made during fifteen years of out-door work; and we will now, therefore, give an outline sketch, as it were, of what we believe to be a true interpretation of the songs of birds.

Including some twenty species of warblers (*Sylvicolidæ*) more or less regular in their appearance, year after year, there are fifty-four birds in Central New Jersey, resident and migratory, that can be considered strictly as singing-birds. These can, with perfect propriety, be classed in accordance with their peculiar temperaments, as VIVACIOUS, SPRIGHTLY, DULL; meaning to express thereby three degress of animation in the songs of birds. As an instance of the former, we mention the House-wren (*Troglodytes ædon*) and Baltimore Oriole (*Icterus Baltimore*); as examples of the second class, the Song-sparrow (*Melospiza melodia*) and the Indigo-bird (*Cyanospiza cyanea*); as birds that are dull, we give the Bluebird (*Sialia sialis*) and the Pee-wee Flycatcher (*Muscicapa Phœbe*). The various songs of the fifty odd singing-birds can be readily placed under one of these three headings; and, curiously enough, the song in every case is indicative of the character of the bird, or *vice versâ*. There is, therefore, a close connection between the song and temperament; in fact, it can be laid down as a law that the latter decides the character of the former; which, we think, bears a good deal on the question of the origin of the songs of birds; for we cannot suppose that some birds were created songsters and others not; but rather, from cries of alarm and quick chirps expressive of satisfaction, sexual selection has evolved the melodious notes of our most accomplished songsters, just as high civilization has produced in time the elaborate music we possess, or are capable of, from the harsh, discordant attempts at melody on the part of existing savages, and mankind's primeval, semi-human ancestry indulged in.

Having briefly referred to the general character of birds' songs, let us glance a moment at other features of these songs, that go to separate them from the other utterances of birds. Prominently stands the fact that the song of a bird is uttered *solely* for the pleasure of listening or being listened to on the part of the songster, and bears no relation whatever to any preceding or subsequent movement of the bird; and we therefore claim that the song of a bird is an expression of melody that gives pleasure to the bird itself and to other birds, which is known to the singer; so that he derives an additional pleasure from this consciousness; or, in few words, the reason that birds sing is precisely the same as that which induces mankind to cultivate music, which with man originally was exclusively vocal.

II.

Let us turn now to the other class of utterances of these same birds, and carefully note them down in all their variations. We have in them material for months of careful study, and would gladly give all the data we have gathered concerning them. Space forbids, and we can mention but the more prominent features. We have, it may be mentioned at the outset, a guide in the proper interpretation of the various utterances of birds that are evidently not songs in the fact that such single expressions, such as chirps, trills, twitters, and shrill cries, are always accompanied by movements, which are closely related to the cries themselves. A bird, when singing, except during early courtship, when gymnastics are also indulged in, does not busy itself with something else at the same time. If busy feeding, it quits work, and taking up a position that better suits it, the bird commences its song, and repeats the same, until wearied with the repetition, or called by its mate or "a sudden thought" to something or some other place. When, however, it is busy feeding, the low chirps and an occasional twitter indicate, if alone, that it is *talking to itself*; or if with company, that it is *talking to them*; for a bird surrounded by others, or in company with its mate, will chirp more loudly, and with a greater variation of notes, than when alone. If disturbed, how different a note is given! Who can doubt the meaning of a frightened bird's alarm-cry?

Again, let us closely observe two birds imme diately after mating. Many of their actions, and their low, ceaseless twittering, are a most laughable caricature of a newly-married couple—say on their wedding-journey. Like poor mankind, bird-kind too have their petty vexations, and the little quarrels of a newly-mated pair of birds are also wondrously human-like, in that the feminine voice is ever louder and more rapid in its utterance, and enjoys that precious privilege of all female-kind, the last word.

We have more than once witnessed such quarrels, and the literally henpecked husband has always been compelled to submit to his tyrannical partner. If he be lazy, woe betide him, when nest-building commences, as it so soon does, after mating. His gay feathers will lose their prim appearance, and mayhap only the fraction of a tail be left him. Yet, notwithstanding all, he will cheer his brooding mate with his choicest songs ; singing, it may be, with greater ardour from the thought that his wife is too busy at home to bother him.

What may all this have to do with language ? Just this, that precisely in accordance with the manner that things go on, whether smoothly or not, are the "chirps and twitters," as they seem to us simply to be ; low, musical, and deliberately uttered, or if from any cause the birds are excited, then these same utterances are shrill, cacophonous, and so rapidly repeated, that the birds, if unseen, cannot be recognized by their voices.

But to constitute language, these chirps and twitters must be shown to convey ideas, it will be urged. Can one bird *tell* another anything ? it will be asked. In conclusion, let us see if it cannot be shown that birds, by their various utterances, do convey ideas to other birds.

Let us turn to that most instructive time in all bird-life, and observe a pair of birds building a nest. There is an instance that occurred before us in the spring of 1872. A pair of Cat-birds (*Galeoscoptes carolinensis*) were noticed carrying materials for a nest to a patch of blackberry-briars hard by. To test their ingenuity, the writer took a long, narrow strip of muslin, too long for one bird conveniently to carry, and placed it on the ground in such a position as to be seen by the birds when searching for material. In a few moments, one of the Cat-birds spied the strip, and endeavoured to carry it off; but its length and weight, however he took hold of it, and he tried many times, impeded his flight, and after long worrying over it, the bird flew off, not, as we supposed, to seek other material, but, as it proved, for assistance in securing the muslin strip in question. In a few moments the bird returned with its mate, and then, standing near the strip, they held what we claim to be a consultation. The chirping, twittering, murmuring, and occasional ejaculations were all unmistakable. In a few moments these all ceased, and the work commenced. Each took hold of the muslin strip, at about the same distance in each case from the ends, and, starting exactly together, they flew off, bearing the prize successfully away. We followed as quickly as possible, and never yet in our experience heard such interminable wrangling and jabbering. The poor birds simply could not agree as to how to use so long a piece of material; and neither being willing to discard it, or agree to the other's suggestions as to its use, it was finally abandoned; but so was the unfinished nest, and the birds left the neighbourhood.

We cannot see how birds can be denied language. A hundred instances such as the above occur every day in the essential details; all indicating that by some means a bird communicates to its companion its own thoughts ; and as we know they have a large range of utterances, is it not presumable that these are the media by which their thoughts are expressed ? We can only judge by the human standard, and, so judged, birds have a spoken language.

We have seen that these various utterances are only expressed when the bird is occupied; and their songs only when the bird is quiet and giving its whole attention to the act of singing. Is there not here, of itself, sufficient evidence to show that birds, like mankind, sing for pleasure and talk from necessity ? At least, we think so.

Chas. C. Abbott, M.D.

Trenton, New Jersey.

SKETCHES IN THE WEST OF IRELAND.

Chapter V.—Antiquities of the Burren.

BY G. H. KINAHAN, M.R.I.A.

FOR the extent of area contained in the barony of Burren, the number of remains and sites of antiquity seem small. The country, however, apparently, never could have supported a large population. We know, from the annals, that they lived very much on the cattle of their neighbours who inhabited the champagne country to the eastward; while the scanty herbage of their hills was famous for its fattening qualities; mention of the fat cattle of the Burren being not uncommon in the different ancient records, as in an old poem (supposed to have been written in the ninth century, and translated by the late Eugene Curry in the "Natural History Review," Dublin, vol. vii. p. 44), that gives a list of all the wild animals in Ireland brought to the Hill of Tara by Cailte Mac Ronain, as a ransom to Corma Mac Art, king of Erin, for his king and foster-brother, Finn Mac Cumhail, where " two oxen from Burren " are mentioned.

In places scattered about, often on conspicuous heights, are some stone forts or cahers, while on others are carns, or monumental piles of small stones. The ancient primitive fortifications of the Irish are called *Raths*, *Moata* or *Moats*, *Duns*,

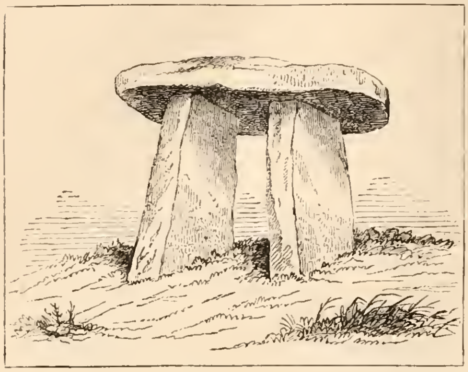


Fig. 52. Doorway of Caher, Inishmore (Aran), Galway Bay.

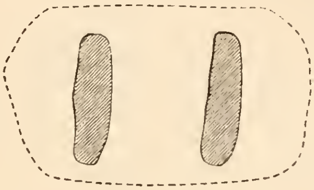


Fig. 53. Plan of ditto.

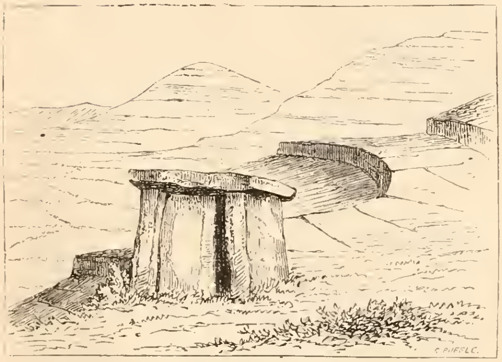


Fig. 54. Fosleac, or Flag-dwelling, Burren, co. Clare.

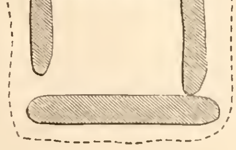


Fig. 55. Plan of ditto.

Cahers, and *Liss*. Of these names, *Moata* seems to be an introduced word from the English, and is applied to some of the royal forts or *Raths*. Rath properly should only be used to denominate a royal residence, but it or its diminutive *Raheen*, is applied very generally by the English-speaking people to all forts. *Dun*, properly, is a round steep hill, but as many of this class of hills were fortified, the word came to be used for large forts. *Caher* signified an inclosure, with a stone fortification or rampart. Many large cahers are called "Duns," while the royal cahers, in the annals, are nearly invariably called "Raths." A *Liss* is an inclosure, surrounded by one or more clay banks, associated with trenches or fosses. In the Burren, all the cahers observed are round or slightly oval, and in

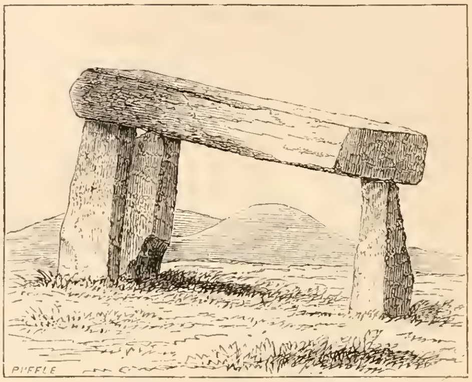


Fig. 56. Cromleac at Castlewellan, co. Down.

general consisted of one thick stone wall or rampart; in some, however, around the outside of the main fortification there was a lesser one, probably principally used as a stockyard for cattle, to preserve them from the wolves. The main fortifications are of different diameters, and most of the large ones seem to have had chambers in their walls. These were about five feet high, four or five feet wide, and of various lengths. In the large ones there was a parapet on the inside of the rampart, on which the inhabitants could walk to view the country or defend the fort. One of these cahers, which is situated on the heights over Corrifin, is of a peculiar and rare type, having, as an outer defence work, a remarkable *chevaux-de-frise*, made of long limestone flags, stuck in the ground thickly together, obliquely sloping outwards, so that even at the present day it is hard to approach it. This defence was from two to three hundred yards wide, while the entrance to the caher was reached by a narrow serpentine path. The doorway to these cahers was of a similar type to fig. 52, which represents the outer portions of a doorway of a caher that once existed near Dunoghil, on Inishmore (one of the Aran Isles), Galway Bay, but the rest of it, and the entire wall of the fort, have long since been taken away by the occupiers of the land. A very characteristic structure of the ancient people of Burren, are their flag-houses, or *fosleacs* (figs. 54 and 55). These fosleacs usually were built of five large flags, four placed upright on edge, the fifth covering them, and lying nearly horizontal, while in one corner was left a space as a doorway. In some, however, the doorway was put in the centre of one of the ends. It is remarkable how soon flag-houses, of much ruder forms than those in the Burren, can be made airtight and comfortable; as all that has to be done

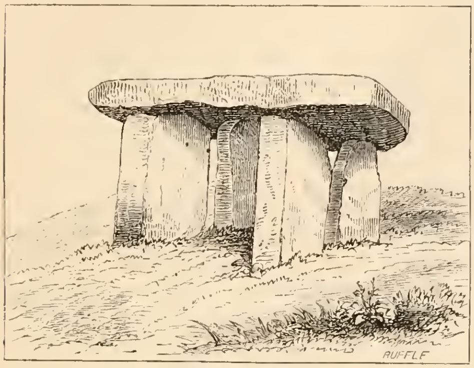


Fig. 57. Doorway into Liss (Clay-fort), Rinoyle, co. Galway.

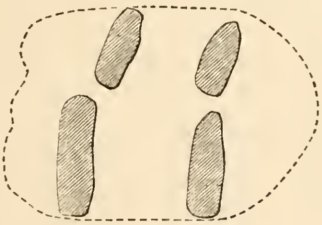


Fig. 58. Plan of ditto.

is to stuff the holes and crannies with heather, and plait a thick mat to use as a door. The latter class of door, in many places in West Galway, is in use at the present day, and is a favourite on account of its warmth and cheapness.

These fosleacs, and many other megalithic structures of a similar type, have been called cromleacs by the English settlers, and are supposed by them to have been erected by the Druids as altars. But that these structures in the Burren were human habitations seems suggested on account of the following. We know from the ancient annals that the early Irish built flaghouses, and those to which we now refer are all placed in situations from which long stretches of pasture can be viewed, while some of them at the present day are still used by the herds during the grazing seasons. Furthermore, in the Burren fuel is, and always was, scarce, and fires are rarely used except for cooking purposes; at other times the "live seed" is kept in a bed of ashes in a round hole cut in the solid rock, and covered with a flag; and such holes are found in the vicinity of the fosleacs. It may be said that the latter have been recently made by the modern inhabitants: this is possible, but it is more probable that the present mode of preserving the "live seed" has been handed down from generation to generation since the country was first inhabited.

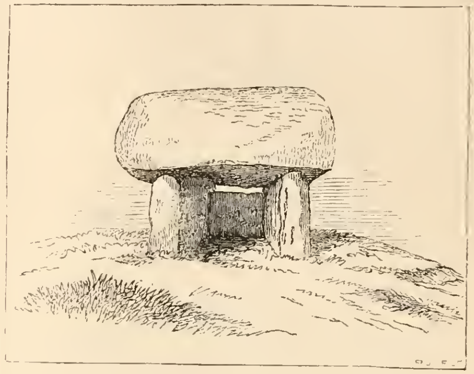


Fig. 59. Kistvaen carn, Maccaul, co. Antrim.

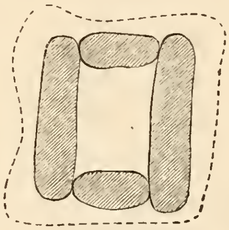


Fig. 60. Plan of ditto.

A true altar, although of the same type, is of a different form. There is one at Kernanstown, co. Carlow, where it may be seen that one side of the cover-stones rests on the ground. This, however, is not always the case, as they are often raised on all sides; but the cover-stone always has a greater or less slope toward the south, as in the cromleac near Castlewellan, co. Down (fig. 56).

Near Rinoyle, co. Galway, there is a structure represented in figs. 57 and 58, which originally was the doorway into a liss or fort, surrounded by a foss and clay rampart. In the immediate vicinity of this ancient doorway the rampart has been removed, but its original use is quite apparent.

Other very similar structures are the Kistvaens, in carns (sepulchral mounds made of small stones), and Tuaims (sepulchral mounds formed of clay), one of which, exhumed from a carn in the co. Antrim (Carn Maccaul), is represented in figs. 59 and 60, the end stone being removed in the latter.

From the above examples it is apparent that although megalithic structures may be of the same type, they may have been constructed for quite different uses, and in some places at first it may not be apparent what was the original object of the erection. For if, for farming purposes, as is often the case, all the stones of a carn or the clay of a tuaim be removed, and only the kistvaen left, the latter may easily be mistaken for a cromleac or true altar, more especially if it is one of those types of kistvaen that is open at both ends. These cromleac-looking structures having been exhumed from carns and tuaims of late years, has induced various wild theories, and led some to believe that all structures of the same or similar type are sepulchral or monumental, although in many cases it is quite apparent they are only a small portion of a once extensive erection, while in or near some of the fosleacs no burial could have taken place on account of the surface of the ground being a solid rock.

MICROSCOPY.

Uniformity in Magnifying Standard.—In the November number of Science-Gossip you published a letter from Mr. Guimaraens on the importance of uniformity of gauge for the so-called universal screw. May I venture to call the attention of your readers to a uniformity in another department of microscopic work, more important and less general than that other: I mean the uniformity of standard of the magnifying power of objectives. This subject has been already alluded to in the December number of the *Monthly Microscopical Journal*. Such uniformity, if practicable, would be a boon, I think, not only to inexperienced beginners when setting up their series of powers, but to all who are engaged in microscopic work. There may be difficulties, unknown to me, which render such uniformity impracticable; and there may be advantages in diversity which make it inadvisable. As an amateur, I do not consider myself qualified to discuss the question; all I wish to do is to call attention to the subject, and to express a hope that the Microscopical Society may see its way to relieve us from the present state of confusion and uncertainty, which naturally result from the absence of any uniform standard of magnifying power.—*Z.*

Earth-dwelling Amœbæ.—The ubiquitous nature of the lower organisms has been noticed in previous volumes of Science-Gossip. Many species of diatomaceæ may be found on mosses growing on trunks of trees or on old thatch; rotifers in the dust accumulated in lead gutters and cisterns; and Professor Leidy* says that, instigated by the researches of Professor R. Greef, of Marburg, published in Schultze's "Archiv f. Microscopische Anatomie," on amœbæ living in the earth (über einige in der Erde lebende Amoeben), induced him to look for Rhizopods in similar habitats. In the earth, or about the roots of mosses growing in the crevices of the bricks of our city (Philadelphia) pavements, in damp places, besides finding several species of Amœba, together with abundance of the common wheel animalcule, *Rotifer vulgaris*, I had the good fortune to discover a species of Gromia. I say good fortune, for it is with the utmost pleasure I have watched this curious creature for hours together. The genus was discovered and well described by Dujardin from two species, one of which (*G. oviformis*) was found in the seas of France, the other (*G. fluviatilis*) in the river Seine. Imagine an animal like one of our autumnal spiders stationed at the centre of its well-spread net; imagine every thread of this net to be a living extension of this animal, elongating, branching, and becoming confluent, so as to form a most intricate net; and imagine every thread to exhibit actively moving currents of a viscid liquid both outward and inward, carrying along particles of food and dirt,—and you have some idea of the general character of a Gromia. The Gromia of our pavements is a spherical, cream-coloured body about $\frac{1}{16}$th of a line in diameter. When detached from its position and placed in water, in a few moments it projects in all directions a wonderful and intricate net. Along this net float minute navicula from the neighbourhood, like boats in the current of a stream, until, reaching the central mass, they are swallowed. Particles of dirt are also collected from all directions and accumulated around the animal, and when the accumulation is sufficient to protect it, the web is withdrawn, and nothing apparently will again induce the animal to produce it. *Gromia terricola*, as the discoverer proposes to name this organism, covers an area of nearly half a line in diameter. The threads of the net are less than $\frac{1}{30000}$th of an inch in diameter.

* Silliman's *American Journal*, January, 1875.

Air-bubbles.—The easiest method of getting rid of air from zoophytes that I have met with is boiling them in methylated alcohol in a test-tube. This will free most zoophytes, or, in fact, any cellular substance, such as wood-sections, hair, &c., from bubbles, and the objects may be afterwards mounted in glycerine jelly.—*C. C. Underwood.*

Mounting in Balsam.—The late Professor Walker-Arnott never to my knowledge boiled the balsam. His practice was to hold the glass slide sufficiently long over the spirit-lamp to evaporate the turpentine *before* placing on the cover. The evaporation would generally be effected in thirty or forty seconds, if held at the distance of 3 or 4 in. from the flame; and although he afterwards finished off his mountings with an asphalt ring, the balsam was always hard enough immediately on cooling to admit of being scraped away from the edges. My own custom has been to clear off the superfluous balsam, while still soft, with a piece of flannel dipped in turpentine, when the slide, if properly done, would bear any amount of rubbing. Precaution should be taken to dry up any atmospheric moisture from the cover before putting it to its place with the forceps.—*E. H.*

It is our melancholy duty to record the death, at the comparatively early age of fifty-two, of Robert Hardwicke, Esq., F.L.S., the founder and publisher of this journal. In him we have lost a tried friend and an intimate companion. Every one who knew him esteemed him for his rare qualities, his sterling honesty, his manly outspokennesss, and his tender sympathies for all that was good and true, as well as for anybody in want or distress. Those who knew him best, loved him most; and he has left behind him a memory that will not only be "ever-green" in the hearts of his friends, but which will become mellower as the years glide by! For the last twenty or thirty years Robert Hardwicke has made himself prominent by the interest he has taken in promoting popular scientific literature. Apart from his own love of it, and even more, for the society of scientific men with whom it brought him into contact, he could see the time was not far off when natural science would take that place in a good education which every one is now preparing for it. Hence his name stands on the title-pages of some of the best as well as the cheapest popular scientific works which have been issued for many years. For this journal he had, we might almost say, an *especial* fondness. It was his own child—the pet of his literary fancy, and he has spared no pains, expense, or time, during the ten years of its existence, to procure for it the wide circulation it now enjoys. His name is associated with that of Science-Gossip as intimately as it can be, and we feel certain that our readers will join with us in the hope that it may long be continued, as a fitting memorial of the founder's energy and talents. Mr. Hardwicke was struck with paralysis—that insidious foe of strong men,—and never recovered. He died on Monday, March 8th, and was buried at Brompton Cemetery, amid a large circle of sorrowing friends, on Friday, March 12th.

ZOOLOGY.

The Wild Birds Act.—If C. F. would look through the schedule of the Bird Act, he would find that some of the birds, for the shooting of which he wishes to levy a fine, are included in the Bird Act, and he has only to inform against any one shooting a spoonbill or a kingfisher between the 15th of March and the 1st of August to make him pay, for the first offence, the costs, which by judicious management he can make considerable, and for the second and other offences a fine not exceeding five shillings, including the costs. The chough, another of C. F.'s favourites, is in the Sea-Bird Act, and, in consequence of the protection afforded by that Act, is, I know, considerably increasing its numbers in North Devon, and is probably doing the same in other counties in which it is resident. As to some of the birds mentioned by C. F.—the hoopoe, roller, oriole, and bee-eater—they do not seem ever to have visited this country in greater numbers than at present. Bewick, Montagu, and other old writers do not mention them as anything but occasional visitants; indeed, the country lies too much to the westward of their usual line of migration for them to be anything else. No amount of fines or acts of parliament would induce them to alter their natural course. Perhaps it is lucky that some of C. F.'s friends are only occasional visitors, and not very numerous, or we should soon have an outcry from our keepers of bees and gardeners, which latter are not very well pleased with the present Wild Bird Act, mild and imperfect as it is.—*C. S.*

A Rare Bird.—A very fine specimen of the Cock of the Rock (*Rubicolæ crocea*) has just been added to the Zoological Society's collection in the Regent's Park.

The Kangaroos.—At a recent meeting of the Zoological Society, Professor A. H. Garrod read a paper on the kangaroo, called *Halmaturus luctuosus* by D'Albertis, and on its affinities, in which such points in the anatomy of the type-specimen were described as served to explain its systematic position. It was shown from the form of the premolar and molar teeth, from the nature of the fur and from other minor details, that this species must be placed in the same genus as the *Dorcopsis Brunii* (Müller), named more correctly *D. Muelleri* (Schlegel). The species, therefore, should stand as *Dorcopsis luctuosa*, being the only other known species of the genus. It was also shown that *Dorcopsis* together with *Dendrolagus* form a well-marked independent group of the Macropoid Marsupialia.

How to Preserve Spiders.—In answer to the query by "S. H." in the March number of Science-Gossip,—a spider is preserved in the same manner as most other insects, viz. by inserting a pin through its body, setting the legs in their right position, and leaving it in a dry place, till it gets quite stiff, when it is ready for the cabinet. But the difficulty is in preserving the bodies of the spiders, which, in a very few days, generally shrink into a shapeless mass. To prevent this, the end of the abdomen should be pricked with a triangular awl, and the contents pressed out by gently squeezing it between the forefinger and thumb. It shonld then be stuffed with very fine carded cotton or down, which can be pushed in by a heckle-tooth when properly distended. The small aperture should be filled up with a little cement, or a solution of gum-arabic. Spiders having rich colours, which are likely to be affected by the action of the atmosphere, should be immersed in a solution of corrosive sublimate, and in an hour after with a thin coating of very weak white-spirit varnish, which is easily made by taking a teaspoonful of the ordinary white spirit or elastic varnish, and adding to it two teaspoonfuls of spirits of wine. Apply this with a fine camel-hair brush. It will quickly dry, and have a strong tendency to preserve the colour. Some entomologists prefer filling the abdomen with very fine sand, instead of cotton; however, both methods answer equally well. There is also another method, though rather a difficult one. Immediately after the insect is killed, extract the entrails; then inflate it by means of a blowpipe, and you may preserve it tolerably well. You must cleanse it on the inside no more than is sufficient to prevent mouldiness, lest you injure the colours, which depend very considerably on the substance that lies beneath the skin. I may here add that the best blowpipe for this purpose is a glass tube which has been drawn to a very fine point.—*C. P. Hall.*

Red-throated Diver.—A specimen of this beautiful diver (*Colymbus septentrionalis*) was killed near a pond in this town on March 4th. The extreme length was about twenty-seven inches from bill to toe.—*W. Macmillan, Castle Cary.*

Basking Shark.—A fine specimen of the Basking Shark (*Selachus maximus*) was captured on Saturday, February 27th, at Shanklin, Isle of Wight. It was seen stranded on a ledge of rocks there, and with some difficulty, owing, not to its resistance but its weight, it was hauled ashore by horses, a gang of men having failed in the attempt. Though it quietly submitted to its fate, it continued to live for some hours. The length of the fish was 28 feet 10 inches; girth 15 feet.—*George Guyon.*

Spiders' Webs and Spinnerets.—I have a paper on this subject nearly ready, which I hoped to have published some time ago, that answers the queries of Mr. Statham and Captain Lang as fully as I am able. This is not saying much, for I cannot yet make out the exact method of the production of the viscid beads. Almost all that is necessary to complete the article are the figures: when I find "a convenient season," which I hope to do very shortly, I will draw these, and I trust that the Editor will accord my observations a place in Science-Gossip. I am unable to say for certain to what species of spider the web figured on p. 53 belongs, but I venture to hazard a conjecture, for which I trust Captain Lang will forgive me, namely, that notwithstanding his remarks, he has found the web of a Ciniflo. The threads are often curled very much tighter than is represented in my drawing; and the "film," there so evident, until you know what to look for, is quite invisible, unless it has been previously stained. I should also remark that the tightly-curled threads look like viscid globules with an inferior microscope, or with a good one a little out of focus: besides, I should imagine, if the "viscid globules" shown in Captain Lang's figure were fluid like those on an Epëira's web, that they would run one into another, and not remain separate globules as delineated. I would also suggest, that the best way to obtain a view of the occupant of an unknown web, is to put a fly or other insect in it, carefully avoiding touching the web in any other manner. Spiders rarely refuse a bait of this sort.—*H. M. J. Underhill.*

BOTANY.

Spartium Junceum.—It may interest some of your readers to know that this plant occurs in great quantities near Whitby, in Yorkshire, about two miles inland, near the banks of a small rivulet, and was bearing seed in August. It was curious to notice that, when the sun was upon them, the seed-pods continually broke open with a crack resembling the noise made by a series of miniature artillery. The seed-vessels were about two and a-half to three inches in length, and are of a black colour when ready to fall. Hogg, in his "Vegetable Kingdom," states that thread is manufactured from this plant; also that bees are very fond of the flowers. He further states that it grows abundantly in Turkey, Italy, and in the South of France.—*W. J. Simpson.*

The Glastonbury, or "Holy Thorn."—Mr. J. A. Fletcher has inquired (Science-Gossip, No. 122) as to the Glastonbury Thorn, as being in his view "a miraculous thorn-tree"; and as such it was no doubt represented by the monks of Glastonbury Abbey; for almost every monastery possessed some object intended to excite popular wonderment and veneration. But this double flowering of trees and shrubs is not a very uncommon circumstance, and I have noticed it in the elder, dogwood, and other shrubs. Such a circumstance takes place every year among apple and pear-trees, and may be seen recorded in local newspapers as recurrent as the stereotyped "big gooseberry." The curious circumstance as to the Glastonbury Thorn was, that its second crop of flowers occurred so late in the year that they could be accredited to Christmas Eve. But it must be observed that when the style was altered by Act of Parliament, and eleven days omitted to correct the Calendar, the "Holy Thorn" did not recognize this alteration, and would not show expanded flowers until *Old Christmas Day.* This was some years since put to the test in Herefordshire, where there were, and still are, several "Holy Thorns"; and so determined were the inhabitants of the rural parishes to trust to the flowering of the Thorn rather than to the Calendar, that the clergymen of many country places felt obliged to hold services in their churches on Old Christmas Day. I have in various years received branches from "Holy Thorns" in January, having mostly unexpanded flowers, soon withering, and no fruit is produced from these secondary flowers. It is generally asserted that all these Christmas-flowering thorns are the product of the original Glastonbury Thorn, which was destroyed by Puritanical hands during the civil commotions in Charles the First's time; but this I think very dubious. Quaint old Aubrey, in his "Natural Remarques in the County of Wilts" (1685), states that "in Parham Parke, in Suffolke (Mr. Boutele's), is a pretty ancient thorne that blossoms like that at Glastonbury; the people flock thither to see it on Christmas Day." Aubrey further says, that he was informed by Dr. Ezerel Tony, "that about Runnymarsh [Romney] in Kent are thornes naturally like that at Glastonbury." He mentions also that "in the rode that leads from Worcester to Droitwiche is a blackthorn hedge at Clayn, half a mile long or more, that blossomes about Christmas Day, for a week or more together." This second flowering of trees and shrubs must then be considered a natural development, under special circumstances, which may or may not be continued, and certainly cannot be *insured* to appear on a particular day, though often doing so, or near enough to the time for the credulous. The real miracle, as affirmed by the monks of Glastonbury, was, that Joseph of Arimathea, after landing in Britain, paused upon Wearyall Hill, near Glastonbury, and planted his staff in the ground, whence sprung the wonderful Thorn that flowered every year at Christmas. That the tree really did arise from a thorn staff stuck in the ground by some pious hand, if not the scriptural Joseph, is not improbable, and this fact, noticed by the abbatial ecclesiastics, was a good thing to convert into the miraculous, while the double flowering was luckily superadded. Hawthorn sticks will, in fact, vegetate, like willow-branches; and Sir T. Dick Lauder, in his edition of Gilpin's "Forest Scenery," mentions the case of a hawthorn stake, taken from a dead hedge, which, having one end sharpened and stuck in the ground, "spontaneously budded, put forth branches, and became a thriving tree." So I myself, some time since, brought home a tall, denuded hawthorn stick that I had picked up, which was stuck in the mould of the garden to prop up some plants; and this has rooted, put forth branches, and is now a flourishing tree of considerable height. It flowered abundantly last year; but as yet has produced no secondary inflorescence.—*Edwin Lees, F.L.S., Green Hill Summit, Worcester.*

Eucalyptus Globulus.—Before we can take for granted that, because the plants in the garden of the Botanic Society have been killed by the severe frost, the climate of England is too cold for their cultivation, as lately stated by the chairman of the Society, it is important that cultivators should have further information on the subject. The age of the plants was not stated, though much may depend upon whether they were old enough to have hardened their wood and bark, which, if only just reared, could not have been the case. In the *Gardeners' Chronicle* of 13th February, a writer is referred to, who says:—"I have known the plant pass through frost (in Ireland) that killed some, and severely injured other plants of seemingly harder nature, such as *Cupressus macrocarpa*, *C. goveniana*, *C. lausoniana*, and *Cryptomeria japonica*. In Hazlewood Gardens, Sligo, with exception of a few leaves being browned, the Eucalpytus has received no injury. These trees have been planted nearly five years. In Limerick it is quite hardy, and I think it has proved itself capable of standing any degree of cold that it may be liable to." In the course of last year I heard of several plants in this and adjoining counties, three, four, and five years old. Many readers of Science-Gossip must be able to give information regarding them, whether they have suffered by the frost, and to what extent. Several young plants, reared from seed last spring, may now (8th March) be seen at Cliftonville Nursery, which have had the upper half of the stems of three out of four and all their leaves killed; of the fourth, the stem is killed to within two or three inches of the ground (the leaves, though dead and shrivelled, have not fallen), the lower parts of the stems and bark are, however, quite green, the bark having a soft, tender, herbaceous appearance, and seemingly alive. Those who can give information should state whether the situation is exposed or sheltered, whether the soil is moist or dry, and if the plants have been kept *plentifully* watered in order to meet the constant absorption and evaporation. I am told that young plants, three and four feet high, kept in the house in large pots, require a great and frequent supply of water. We may hope to learn from correspondents of SCIENCE-GOSSIP that plants three or four years old, with hardened wood and bark, have not been killed, and that the cultivation of a tree in which so much interest has been taken may be persevered in. It may, however, I think, be taken for granted that for the first year or two precaution should be taken to protect from the frost.—*T. B. W., Brighton.*

GEOLOGY.

THE KIMMERIDGE CLAY OF ENGLAND.—This was the subject of a paper by the Rev. J. F. Blake, M.A., F.G.S., recently read at the Geological Society. The author described, in considerable detail, the development of the Kimmeridge clay in various parts of England, dwelling especially upon the palæontological phenomena presented by it in the different localities. He arrived at the conclusion that the Kimmeridge clay in England is divisible only into two sections, Upper and Lower; but when it is preceded by the Coral Rag, it possesses a basal series of no great thickness, which may be designated the Kimmeridge Passage-beds. He compared his Upper Kimmeridge with the lower part of the "Virgulien" of foreign authors. It consists of paper shales, paper slabs, bituminous shales, and cement-stones, with interstratified clays, and may attain a thickness of at least 650 feet. Its fauna is characterized by paucity of species and great abundance of individuals. It is thickest in Dorsetshire and Lincolnshire, but thin or absent in the inland counties. The author stated that no fauna comparable with that of the Middle Kimmeridge, or "Ptérocérien," has been discovered in England, though some of its less characteristic fossils occur associated with Lower-Kimmeridge forms. The Lower Kimmeridge is a mass of blue or sandy clay, with numerous calcareous "doggers," largely developed in Lincolnshire, the whole representing the "Astartien" of foreign geologists. Its thickness is estimated at from 300 to 500 feet in Ringstead Bay, and about 400 feet in Lincolnshire. The fossils of the Coral Rag extend up into the Kimmeridge passage-beds, which are typically developed at Weymouth, where they are about 20 feet thick.

THE CAMBRIDGE GAULT AND GREENSAND.—This was the subject of a paper read at the same meeting of the Geological Society, by A. J. Jukes-Browne, F.G.S. This paper has for its object to determine the true position of the Cambridge nodule-bed in the Cretaceous series, and to investigate the nature and origin of its peculiar fauna. The first part of the paper deals with the stratigraphical relations of the beds; and the author calls attention to the fact that in the numerous artificial sections near Cambridge only two formations are really visible, viz., the chalk marl with a pebble-bed of phosphatic nodules at the base, and the stiff dark clay of the Gault, upon which these rest. The so-called greensand or nodule-bed passes up into the chalk marl, but rests unconformably on the gault below, which presents, in fact, a *surface of erosion;* and there is, therefore, a *break of indefinite length* between the Cambridge Gault and Greensand. The nodule-bed continues to present much the same characters and fossils through Bedfordshire as far as Sharpenhoe, a village about three miles east of Harlington, on the Midland Railway. Here is situated the most westerly coprolite pit or working in the Cambridge bed; and beyond this the gault passes into chalk marl without any such seam intervening. It is not until we enter Buckinghamshire and reach Buckland, near Tring, that anything like true upper greensand appears, and separates the chalk marl from the gault. From this point westward the formation increases in thickness and importance, but its characters and fossils are quite different from those of the Cambridge greensand. Although, in Bucks, no coprolites are found between the gault and greensand, yet they occur in the gault itself; and one bed may be traced towards the N.E., and is found to commence where the Cambridge nodule-bed ends; thereby raising the presumption that it becomes confluent with that bed, and has furnished many of the well-known fossils and nodules it contains. A consideration of these facts warrants the following general conclusions:—1. That the Cambridge greensand or nodule-bed has no connection with the upper greensand, its actual position being at the base of the true chalk marl. 2. That the same bed rests unconformably on the clay below, and that its coprolites and fossils have been derived from the gault. 3. That in consequence of this erosion a great gap now exists in Cambridgeshire between the lower gault and the chalk marl, the whole of the upper gault and upper greensand being absent. The palæontological evidence leads to exactly the same conclusions. The fauna is divisible into two groups, and the fossils belonging to the one are preserved in dark phosphate, and being generally waterworn, are clearly derived forms, while the others are of lighter colour, and belong to the deposit. The former group is chiefly composed of gault species, 70 per cent. of which belong to the upper stage of that formation; while the fossils proper to the deposit are also found in the chalk marl above. The author therefore feels justified in concluding that, stratigraphically, the bed is chalk marl, while, palæontologically considered, its fauna is mainly derived from the upper gault.

BASALT.—In No. 123 you notice a paper by Mr. R. Mallet, C.E., F.R.S., on this rock, in which he shows "that all the salient phenomena of prismatic basalt can be accounted for by cooling, and that the theories in text-books on basaltic prisms are untenable and unnecessary." Will you allow me to refer Mr. R. Mallet, through your pages, to the *Geographical Magazine* for August and September last, where the same conclusion is reached by another road? I have travelled over hundreds of miles of large level tabular masses of basalt, cracked into every variety of shape except the prismatic column; it is now said that, when these masses split by the contraction of cooling, the surface will divide itself "into similar geometric figures of equal area, which, on mechanical principles, must be hexagons." It seems that, as all columnar basalt is in small patches, and in localities from which overlying matter has been taken off by natural denudation, it owes its prismatic shape to pressure—an individual cell in a honeycomb owes its form to the pressure of six cells on its circumference, may not the basaltic prism owe its shape to the same cause—while the mass is kept from spreading by the surrounding masses of other material? There is another point that requires greater accuracy; Mr. R. Mallet says that a splitting rigidity is attained by basalt at a temperature "between 900° and 600° Fahr." Mr. H. Woodward, in the *Geological Magazine*, No. 114, tells us that "nearly 800° Fahr. would produce "aqueo-igneous fusion." It could not split in this condition! Basalt contains in its constitution matter that can be converted into bassan by the action of fire, or that is soluble in water,—no fire-made rock could contain these materials!—*H. P. Malet, Florence.*

NOTES AND QUERIES.

Aquaria.—Having passed through the difficulties which seem to annoy "W. H. S.," I am desirous to suggest some things which appear to me to cause his failures. I understand from the animals and the plant (*valisneria*) he mentions that his is a freshwater aquarium. From the suggestion of his friends too, I should suppose, at the outset, his difficulties arose from over-growth of confervæ, and that the water was becoming like "pea-soup," as some authorities compare it when in this state. If this should be the case, simply screening the aquarium from the light would correct it. Then again, if it has not sufficient light, the confervæ would become, as he says, "white" and "slimy." But the confervæ, or slimy matter on the stones and sides of the glass, is essential to the life of the animals and the well-being of his aquarium. Oxygen cannot be supplied to the animals it contains sufficiently without it. Therefore to scrub or clean the glass, shells, &c., is only taking from them that which should be the life of the fishes, &c. I should recommend him to allow the substance he calls slime, but which I think must be confervæ, to remain, and wait; it will become green in a little time, and will then be the very life of his aquarium. But it would be well not to allow many fish to be in the aquarium until the confervæ have grown. These things I long struggled with myself; but I have now thoroughly overcome them. I found it best to put the fish in one or two at a time, and watch if they were comfortable, and that they did not seek the surface for air.—*P. W.*

Hedgehogs Carnivorous.—Having kept a pair of hedgehogs and young for two years, I can verify the statement of "W. Sharp" that they are carnivorous and almost omnivorous. My little boy once caught a frog in the kitchen, and gave it to a young hedgehog we had; when it seized it and tore at it like a cat; and so fierce was it that the little boy, much amused, attempted to take the frog from it, and lifted the hedgehog from the ground before it would relinquish its hold, and not even then. Many times after he brought the hedgehogs birds, toads, frogs, mice, and lizards, which were all alike devoured with much relish. They come out after dusk and run about; and when milk is on the fire for their suppers they always know, and come out accordingly. Nor is this all; I have caught the rebels more than once gnawing at my boots, and often would they pick up a child's stocking and drag it into their nest.—*P. W.*

Marine Parasites.—If he does not possess the work, it may be useful to "Mr. McGann" to learn that Gosse, in his "Marine Zoology," describes the Epizoa as "usually living attached to the gills or to the interior of the mouth of fishes," and the parasitic Entomostracæ as "creeping on the surface of the body." The following fish have species attached to them: Shark, ray, sunfish, halibut, turbot, brill, scabream, mackerel, gurnard, dory, angler, sole, sprat, salmonidæ, &c. Some species are found on whales and other Cetacea, and some in the sac of Ascidia, on the gills of the lobster, and beneath the carapace of prawns and allied Crustacea. Also in White's "Popular British Crustacea" several species are figured and described.—*G. G., Ventnor.*

Caterpillars of Goat-moth.—The return of February reminds me of some Goat-moth Caterpillars which I found this time last year in an unusual position. They were coiled up and enclosed in a very thin and loosely-spun silk cocoon, lying underneath a sandstone in the grass, by the side of a country lane. The nearest trees were oak, but were about twenty yards off, and there was a ditch on each side of the lane to be crossed first. The larvæ were apparently full grown, but had left no trace of their burrow, since the hole under the stone was only just sufficient to hold them. I placed them in a pot of earth, into which they burrowed immediately, and did not show themselves till the imagos came out on the 10th and 11th of July.—*J. T. G., Rock Ferry.*

Gooseberry Caterpillar.—I have been surprised to see the ignorance displayed by correspondents as to this insect. In the January number, "H. E. Watney" declares it to be the larva of the Currant or Magpie-moth; and in that of February "A. N." says it is nothing of the kind, but it is the larva of "a small, dingy, yellow fly." Now both of these suppositions (I cannot think them more) are wrong: the insect is neither more nor less than the larva of the V. moth, one of the common Geometræ, as will be seen if any one takes the trouble to rear one or two of them.—*Castle Barnes.*

Water-docks.—The attention which has been recently directed to *Rumex maximus*, and its inclusion in the new edition of the "London Catalogue," will doubtless lead to fresh search for this dock this year. Its continued occurrence at Lewes, the only station mentioned by Syme, leads me to ask what others are known for it in that neighbourhood? May I also inquire whether in any instance it has been found growing *with* or near *Rumex Hydrolapathum*, which is to be found in some places in West Sussex abundantly? I have some of the atteunate-based root-leaves of *Hydrolapathum* now before me (February 8), and have reason to think that it has been sometimes confounded with *maximus* in this district, although I have not met with the latter. For any information as to the distinctive characters of *Rumex maximus*, in addition to those relating to its perianth and root-leaves, or for other facts relating to this species, I should be much obliged.—*F. H. Arnold, Fishbourne.*

Eels out of Water.—The overflow of a pond is allowed to run by a tiled gutter into a tank of about eight feet in depth. At each end of the gutter is placed a grating to prevent the leaves from following the course of the stream, which had, however, the effect of raising the level of the water somewhat, so that it found its way by the side of the framework of the tank. Something was seen to move, on the left side on a level with the water, and to protrude its nose. Thinking it some mouse or mole, it was touched with a stick, which, however, made it retreat instead of advance. A spade was procured, and an eel, of over a pound in weight, *dug* out, to the no small astonishment and amusement of the lookers-on, and then turned into the tank. The questions naturally suggest themselves as to how long the eel had been living there, its size at first, and how the hole was made.—*R. T. C.*

The Colorado Potato Beetle.—Notwithstanding the opinion expressed by those in authority, as recorded in last year's volume of Science-Gossip (p. 89), our friends in the Sister Isle have not been able to subdue their fears of an invasion by this "new enemy," Mr. Herbert asking in Parliament the second day of the present session (Feb. 8) what the Government intended doing to prevent the introduction of this beetle into Ireland. In reply, Sir M. Beach stated he was holding communications on the subject, but he thought the danger had been much exaggerated; the most careful consideration would be required before taking any action; of European powers only Austria and Belgium had called the attention of their legislatures to the subject. However much the readers of Science-Gossip may deplore the ravages committed by *Doryphora decemlineata*, they will at least feel a certain kind of respect for the beetle that has secured for itself so much notice in high places.—*W. R. H.*

How Little Birds support themselves in Winter.—In the course of a ramble through the fields during the very severe weather which distinguished the closing week of 1874, my attention was arrested by noticing that a little bird seated on the topmost twigs of a pollard willow, at the opposite side of a field from where I was passing, did not apparently move from its place. I accordingly crossed to the foot of the tree, and was rewarded by a sight which I shall never forget. Perched, as I have described, was a female of the Marsh Tit (*Parus palustris*), busily engrossed in a search for her dinner. I have repeatedly seen birds of the same family (the Paridæ) picking their food from the outer bark of trees, crannies of walls, &c.; but the motions of the individual bird now before me indicated that the materials of her repast lay beneath the surface. Mrs. Tit was vigorously digging into the substance of the twig upon which she was perched, tearing off the bark in shreds, which she kept tossing away with quick, impatient gestures. For some time I stood spell-bound in admiration of her dexterity. Clinging to a twig not thicker than a lady's little finger, sometimes in an upright position, but more frequently back downwards, she kept her bill in perpetual action upon the twig. The easy adroitness with which she shifted her feet, especially when seeking to increase or diminish the leverage necessary in enabling her to deal with some shred of bark tougher than ordinary was perfectly marvellous, and her address in disinterring the objects of her quest was not less so. In a little time I was joined by a rustic, who, attracted by my motionless attitude, had come to ascertain what was the matter. Once I had explained to him what the bird was about, his eagerness in watching was quite equal to my own. At last the tit, startled by the discharge of a fowling-piece in another field, flew off in alarm. I then managed to secure the branch which had been the object of the bird's operations. It presented a curious appearance. The outer bark was much of it torn off, and the inner and tougher rind hung in jags in a very irregular fashion, much reminding one of a branch that has been gnawed by some playful puppy. With the naked eye we could not make out the object of the bird's inquisitive examination. A pocket magnifying-glass brought into requisition revealed to us that the bark was punctured at irregular distances with small holes beautifully drilled. On removing the bark in the neighbourhood of each drill that had been undisturbed by our predecessor in the work, we found a jolly little grub, tinted like healthy salmon ova. The grubs were discovered just underneath the inner bark, and uniformly in an upward direction from the drilled holes. I inclose a specimen of the tit's workmanship, now of course very much withered, having been in my possession since the 26th December; also a more recent specimen from the same tree for examination, trusting that some of your correspondents versed in entomology will kindly aid me in identifying the insect inhabitant, which I have hitherto been unable to manage for myself. From the colour of the bark, and the decidedly brittle nature of the branches, I am inclined, in the absence of foliage or catkins, to regard the tree as *Salix fragilis*.—*W. Hodgson.*

Fleur-de-Lis.—In the article under this head in the last number of Science-Gossip, for "it *forms* part of our Royal Arms," read *formed;* it was omitted when our monarchs ceased to style themselves Kings of Great Britain, *France*, and Ireland, after the peace in 1815.—*T. B. W.*

Parrots; How to Keep them.—To "J. J. M." Your Parrot's death was probably caused either by cold, or by too much moist or otherwise improper food. The best directions I can give, derived from experience and from books, are as follows: firstly, never keep a parrot in a cold room, and *never* in a draught, remembering that parrots are natives of the hottest countries in the world, and are very sensitive to chill, especially when young. Cover the cage at night, and with a warmer cover during the winter; also, when out of doors, protect the top of the cage from the sun, if it is very hot. Secondly, keep the cage clean, especially *the perch and food-vessels.* Thirdly, never give it meat, or anything that contains salt. Let the staple of its food be Indian corn, either raw or boiled; the first is preferable if the parrot is accustomed to it, as when boiled it soon turns sour. Give it for variety, hempseed, not exceeding a table-spoonful, canary seed, biscuit, or filberts. Hempseed being heating is useful in winter. Rice pudding, or bread and milk once a day, may be given without detriment, but be careful in giving the latter that it is squeezed dry. Too much moist food causes diarrhœa, and if this occurs, the parrot should be kept entirely on dry food, giving it water to drink. Any kind of ripe fruit will not hurt it, when in health, but very little at a time, say a strawberry or division of an orange. A parrot does not often want to drink, unless it has dry food only, and from its mischievous propensity to upset the drinking-vessel, it is better not to leave water in the cage; but in this case remember to offer it water two or three times a day. The floor of the cage should be daily sprinkled either with fine gravel or sand, but take care, if the last is used, that it is not salt. When out of his cage offer him a bath if he enjoys it, but I have never known a parrot care much for it. I have now had one for fifteen years, having previously lost one two years old, from careless feeding and exposure to cold. Beeton's Book of "Home Pets," Part I., "The Parrot Tribes," price 3d., contains many excellent hints; but if a parrot is taken good care of he will rarely need doctoring.—*A. Tregelles.*

Musselling.—I remember several years ago being told by the medical gentleman who attended me when I was ill from the effect of eating mussels, that these shell-fish were rendered poisonous at certain times of the year by feeding on the eggs of the Star-fish, *Uraster rubens.* An old Welsh cook of my acquaintance used to put a silver spoon in the stewpan along with the mussels, and always said that if there was a dangerous one amongst them the silver would turn black. Mackerel will occasionally affect persons disagreeably; so will various kinds of shell-fish. A lady on a visit to me in Hants a few years ago, was made ill by eating crayfish.—*Helen E. Watney.*

A Water-snake.—People in this district talk much of the existence of a water-snake, which they describe as being very different from the common species, and almost black in colour. I have seen the common snake swim across a river with the grace and agility of an eel, and this latter I suspect to be the water-snake of the rustics.—*W. H. Warner, Kingston.*

Gooseberry Pests (Science-Gossip, No. 122, p. 46).—Your correspondent "A. N." is rather too hasty in his statements about the Gooseberry Caterpillar, as I hope to show to any one who has the patience to read these few lines. Among the numerous pests that infest our gooseberry and currant trees, two stand pre-eminent for their destructive properties. One of these is the true Gooseberry Caterpillar, the larva of the Currant-moth, *Abraxas grossulariata*, which is so abundant sometimes that one collector, Mr. Bishopp, of Ipswich, I think, reared 1,400 imagos in a single season, to obtain varieties of course. The other, which is if possible even more destructive, is the larva of a sawfly, *Nematus ventricosus*, whose general appearance is well described by "A. N." The former, which hybernates in the old leaves of the currant and gooseberry, is best destroyed by collecting them after they have fallen, and burying or burning them. For the latter, which does not hybernate, I am afraid there is no better remedy, speaking from long observation and experience, than the tedious process of hand-picking.—*G. P. H.*

Common Smooth Newt (*L. punctatus*).—This interesting little reptile is commonly found in quarry and sand-pit pools, localities which should be frequently visited by every out-door naturalist. On the 4th of June, seeing a bundle of willow twigs lying in a small pool frequented by smooth newts, curiosity prompted me to examine some of the submerged leaves. Several of these had their ends folded over very tightly, and under each a single egg of the newt, oval in shape, and transparent in colour, except the germ, which was of a greenish white. Various common grasses growing at the edge of the pool had also been utilized by the newt, some of the blades having been folded two or three times, each fold inclosing an egg. I mention these little facts merely to show that the newt is by no means particular on what plants she places her eggs. Thus, when starwort fails, she is not averse to using in its stead grass blades and willow leaves.—*W. H. Warner, Kingston, Abingdon.*

Microscopical Query.—A few days ago I was engaged with my microscope, and I was, by way of experiment, dissecting an ant in turpentine. Having done so, about a minute afterwards I examined the leg of the creature, and was much surprised to find the small drop of turpentine in which it lay greatly agitated, and full of minute black spots, which revolved rapidly, and which I took for animalculæ, but which, on inspection under a higher power, were not more clearly defined. I should be much obliged to any reader of Science-Gossip who could supply me with any information on this point.—*H. C. Mo.*

Preserving Insects.—Insects of the beetle kind are best preserved by throwing them into boiling water. They die instantaneously, and I advise "Ento., Hull," to try this plan.—*Helen E. Watney.*

The Queen Bee.—Sir J. Lubbock, in his recent lecture on bees and ants, expresses a doubt as to the death of a queen bee being lamented by the hive. An amateur bee-keeper, and a naturalist in his pursuits (my relative G. Fox, of Kingsbridge), showed me a piece of comb, in the centre of which a dead queen bee was hanging by her claws. About 100 dead bees were also on the comb, all, both above and below her, having their heads turned towards her, having looked on their sovereign "*in articulo mortis.*" As the hive contained plenty of honey, could anything but despair at their forlorn condition have occasioned their death? Possibly there was no brood young enough to be fed and trained as royal highnesses, whose individual strength, on emerging from their cells, would be tested, and the most vigorous, or the first that attained the imago state for occupying the vacant throne.—*C. Fox, Trebate.*

Aquaria.—In reply to your correspondent "W. H. C." with regard to the difficulty he has with his aquarium, it is, in the first place, a great mistake to use a bell-glass for such a purpose however large, for the most important thing connected with the success of keeping aquatic animals, &c., is that there should be a large surface of water exposed to the air, which is never provided for in the ordinary aquaria sold in shops; hence the great difficulty experienced in the use of them. The correct form of the tank should be a large shallow vessel with plenty of light, and also dark nooks and shady hollows, for most fish cannot stand a continual uniform light such as they are obliged to put up with in a bell-glass or globe. The proper balance of fish, insects, and plants is best ascertained by observation, and can soon be arrived at. It is scarcely necessary to remark that a considerable amount of care is required in the selection of the occupants for the tank. Sickly plants, refuse, &c., should instantly be removed. Well-managed aquaria do not require change of water for a considerable time, but this will depend upon existing circumstances, such as position, size, &c., of the tank.—*Ed. Lovett.*

Nests of Mice.—One of the most remarkable, and, perhaps, one of the most valuable features in the study of natural history, is the constant discovery of something new. Ten thousand eyes may have noticed the same thing before, but it is new to us, and we hail the discovery with delight, while it adds to our store of knowledge. How often have we who love nature so much that we almost aspire to the proud name of naturalists, to confess that we know *nothing!* For example, a friend asked the writer the other day if he knew the nest of a certain mouse, and the truthful answer was that the writer had never had the pleasure of seeing the nest of any mouse. Many readers of Science-Gossip will understand the humiliation of such a confession. Of course an early reference was made to the back volumes of this Journal for information, but with very little result. Other works were resorted to, and very little information gained. The friend referred to gave the writer an opportunity of seeing a very interesting nest which was found in an outbuilding recently, and which the friend ascertained to be the nest of the short-tailed field-mouse. It was beautifully formed of straw, and though larger than a cricket-ball weighed only half an ounce. The entrance to this interesting little home was perfectly rounded, and very artistically finished. None of the disagreeable odour of the common mouse could be detected about the nest. The nest in appearance is much the shape of that figured in Wood's "Natural History" as that of the harvest mouse, but this one is more solid, and not of uniform texture so far as material is concerned. The inside straw has been bitten or torn into very fine fragments (resembling hay), while the outside is of straw in its normal condition. It was found near the ground, and not attached to a stick or stone. If these few remarks should lead some kind reader to write a chapter on the nests of British mice, they will not have been penned in vain.—*W. Macmillan, Castle Cary.*

Gooseberry Caterpillar. — I really think "A. N." will find that the grub usually known by the above name, is the larva of the magpie-moth (*Phalæna grossulariata*). Perhaps he alluded to the "Gooseberry Saw-fly" (*Tenthredo grossulariæ*). As the eggs of the magpie-moth are hatched in September, and the young larvæ seek shelter in the soil under the bushes, I, by removing the earth at the end of that month, destroyed the pests before they became active. I removed the cause of the evil, and do not feel that I quite deserved his strictures, especially as I, to make assurance doubly sure, advised a like rousing of the soil again in spring.—*Helen E. Watney.*

The Shepherd's Purse (*Capsella bursa-pastoris*).—I remember, when at school at Birmingham, that my playmates manifested a very great repugnance to this plant, which was found abundantly on the waste grounds. Very few of them would touch it at all, and it was known to us by the two bad names, "Naughty Man's Plaything," and "Pick your Mother's Heart out." Having seen no notice taken of such repugnance or ill names in botanical notices of this plant, it would be interesting to know whether the prejudice exists elsewhere, or is purely local.—*W. Macmillan.*

Hedgehog.—One of my sisters, who resides at Bridlington Quay, had a hedgehog, of which she had made a pet, and in her house it had a free range of the basement, kitchen, and area. Thus domesticated it was fed well, and fared liberally during the warmer part of the year, and hybernated in some secluded corner in the colder season. Ordinarily, with the return of spring, it reappeared too; but a singular exception occurred: for the summer came and went, and a second winter passed, and then, after the interval of a whole year, on this one occasion, the long-lost Echinus again came, to my sister's no small surprise. That it was her identical old friend, its familiarity and ready resort to favourite haunts quickly proved, and she had no uncertainty on this score; but where it had been, and how it had subsisted, were unaccountable. From the nature of the situation, egress seemed impossible. The area is small, and wholly walled in, communicating merely with an outhouse where sticks and wood are stored. My sister thinks it must have lain dormant all the time in the outhouse (her area is some eight or ten feet deep, cut off from a garden); and therefore she looks on continued dormancy as the only satisfactory explanation.—*Thomas Cape.*

Expansion of Water in Freezing.—During the recent severe frost at Christmas the thermometer registered 1° below zero; and in the west bedroom at the Vicarage the water in both ewer and bottle was frozen solid. The ewer was broken in two; the bottle was filled with water within an inch of the top of the neck, and a glass tumbler turned upside down upon it. In freezing, the column of ice in the neck of the bottle rose until it was nearly 3 inches *above* the top of the bottle-neck, and the tumbler suspended on it. The column of ice looked like a semi-transparent wax candle, and was between 3½ or 4 inches above the level at which it began to freeze. It was to me one of the most interesting illustrations of the expansion of water in freezing I have ever seen.—*H. O. S., St. Edmund's Vicarage, Gateshead-on-Tyne.*

Cats and Water.—There has lately been, in the columns of the Glasgow papers, a correspondence relating to the disappearance of the trout from the fountain in the West-End Park. Many explanations have been offered, such as the depredations of beggars, of cats from the neighbouring houses, and of the numerous gulls and other sea-fowl which frequent the Kelvin, which is but a short distance from the scene of spoliation. In *this* case I certainly am of opinion that the disappearance of the trout is caused by the last-named, everything tending to make the poor fish an easy prey, the locality being comparatively remote, and the pond being very shallow. But there seems to be an opinion amongst many persons that the dread which cats feel for water is so strong as utterly to prevent them venturing to catch fish in their native element; but, as far as I have observed, this is not the case. I am not quite certain that cats fear water so *very* much, and I am *quite* certain that they often frequent both still and running waters in the hope of a finny prize. I may mention one instance which lately came under my own observation. Near the junction of a mill-sluice with the river Kelvin, where the water flows very rapidly, I observed a cat crouching on a projecting stone. Every now and then it would dart its paw into the water, but always without success; it once, however, seemed to have caught something, and then *both* its *fore-paws and its head* were immersed in the water for a moment or two. I did not see, however, if it had made a capture. I have several times observed a cat in a similar position, but not having taken notes at the time of occurrence, cannot give the exact circumstances; and I can confidently vouch for the veracity of many cases which have indirectly come under my notice, but which do not need to be repeated here, as they would be nearly a repetition of the foregoing. Any one living near a pond or stream, and being in the possession of a cat, may, with a little circumspection, soon satisfy themselves that cats will, without hesitation, dare water to obtain fish.—*W. Sharp.*

Ladybirds.—If "G. C. L." will refer to Cassell's German Dictionary, he will find both Sonnenkäfer and Marienkäfer given for Ladybird. In Chambers's Encyclopædia, Marienkäfer is also mentioned. Perhaps the two words are used in different parts of the country.—*R. H. M.*

Moths in Repose.—If "S. A. B." will refer to Newman's works on British butterflies and moths, he will find that moths when in repose fold their wings round their bodies.—*R. H. M.*

Moths' Wings.—Moths, as a rule, only arch their wings, as butterflies, on emerging from the chrysalis, but as soon as they are fully distended and dried they are drawn up round the body. Doubtless the specimen that "S. A. B." captured had recently emerged.—*R. Haynes.*

Urticating Effects of the "Brown-tail" Caterpillar.—When the caterpillars of the Brown-tail (*L. chrysorrhœa*) have be taken themselves to their winter abodes, their nests may be handled freely even by those who suffer at other times from their irritating powers. But before the caterpillars have come forth to feed up in April, an unpleasant warning is given that they are rousing from their winter sleep, by their crawling about within their nests, and thus set adrift particles of fine dust or hair, which soon make themselves felt if the nest is handled unwarily, or even approached.—*J.R.S.C.*

Spring Appearance of the Humming-bird Hawk-moth.—Though this moth is always supposed to hybernate and reappear in the spring, it is seldom noticed at that season by entomologists. I saw a specimen flying briskly in the vicinity of Gravesend, on April 2nd, 1874.

Supplying Caged Birds with Green Food.—Among other advantages derivable from the regular supply of such plants as chickweed, shepherd's purse and groundsel to caged birds, especially finches, I find that these almost always increase the appetite, leading them to eat more seeds, in cases when they appeared falling off a little from their ordinary food. In early spring the leaves of the plantain are much relished by bullfinches and canaries, and they seem to have a wholesome effect. I should like to hear the opinions of the bird-fanciers who read Science-Gossip regarding the statement often repeated in books, that birds derive no benefit, but rather the reverse, from green food given in frosty weather. I have not found any evil result on a small scale, provided the food is not given too damp.—*J.R.S.C.*

Birds and Flowers.—You request your correspondents to note down their experiences on this subject; consequently, although a little note of mine in *Land and Water* of the 30th May relates to the same matter, I send you the following gossip:—I have constantly observed that most caged birds are particularly partial to primroses—canaries are especially so; and this spring I noticed some finches guilty of considerable mischief amongst primroses, oxlips, and cowslips. All three flowers were growing on the same bank, at the bottom of the garden, and I had several opportunities of watching the birds at mischief. Sparrows are partial to the bloom-buds of the Wisteria, and I think that many birds are attracted to different flowers by a love of brilliant colours; for a robin I had invariably flew to the plants in blossom in my bedroom window, when he was let out of his cage; but in the case of the finches attacking the primroses, I attributed it to their fondness for the nectar contained in the flowers, for I picked a great many primroses and oxlips, and did not find a single insect in them.—*Helen E. Watney.*

Seaside Shrubs.—I think, in answer to Mr. Edward H. Verney's query just recently, a shrub commonly called Tamarisk grows well in exposed places by the sea, as the slopes of the Parade or Sea-front here are thickly planted with it, as also many gardens near the sea at Brighton; and I have seen beautiful shrubs in a garden here in Devonshire-place, some 15 or 20 feet high. I daresay you know it is an evergreen with foliage very similar to a *juniper*, and having a feathery appearance. The (smaller) branches are a reddish tint. Wall-flower also grows on the same slopes, and is now very abundantly in flower, and gives the Parade quite a pretty appearance. There is also an evergreen shrub, with small oval leaves, bright and shiny, I think a kind of bay-tree, which grows well in gardens here, and is very bright and pretty. I don't know its botanical name.

Correspondence Received up to 12th ult. from:—T. B. B.—F. K.—Dr. G. D. B.—G. L. H.—G. H. K.—F. J. A.—H. M. J. U.—W. H.—T. B.—H. G. G.—R. T. C.—A. L.—E. S.—W. G.—G. F. B.—C. S.—H. E. W.—F. H. A.—H. O. S.—W. W. P. H.—S. H.—W. M.—E. L.—W. S.—J. S.—J. T.—W. R. H.—T. C.—C. C. A.—A. B.—W. J. S. S.—H. J. McG.—E. H.—W. C.—L. R.—J. H.—T. E.—T. W. W.—J. B.—E. W.—J. C. D.—W. E. G.—J. S. H.—J. H.—J. G. R. P.—L. S. F.—C. B.—W. T.—F. W.—W. E.—G. G.—E. J. L.—M. S. B.—J. T. G.—W. R. L.—H. A. M.—J. W.—J. R. S. C.—T. B. W.—H. G. G.—H. B. T.—A. T.—J. C.—F. E. F.—S. S.—M. D.—G. P. H.—C. J. C.—H. M. C. A.—G. W.—T. McG.—B. G. C.—C. O. G. N.—T. H.—A. F. M.—H. H. B., jun.—I. G. H.—M. H. M.—E. L.—C. P. H.—C. S.—J. T. T. R.—E. L.—W. S.—W. G. P.—T. B.—P. B.—F. C. C.—M. H. C.—J. J. H.—T. W. B.—W. H. G.—A. H.—F. C. P. H.—W. W.—A. D.—W. T. G.—H. R. W.—W. H. R.—S. C. D.—C. E. B.—A. J. B.—F. E. F.—G. G.—W. K. M.—H. I.—M. Y.—C. J. W.—E. T. S.—W. W. N.—J. C. H.—R. R. F.—T. E.—W. J. H.—A. B. H.—T. H. H.—G. B.—M. H.—A. C. H.—G. D. P. M.—E. H. G.—W. J. S. S.

NOTICES TO CORRESPONDENTS.

To Exchangers.—We have been requested to beg those who make use of our Exchange Column, to keep faith with any who may reply to them. It is essential that all exchanges should be ready before publication.

To Querists.—We have several queries whose answers we are forced to postpone, chiefly owing to the melancholy incident which has occurred in connection with Science-Gossip.

J. Thompson, and others.—Answers next month.

W. W. P. H.—If you will refer to back volumes of Science Gossip, you will get ample information concerning aquaria.

An Occasional Correspondent has sent us a poem from the well-known "Olney Hymns," in which is given, on page 295, the account of a "Toad and Spider," referred to in the January number of Science-Gossip by James Pearson.

L. S F.—Your fossil fish is undoubtedly genuine. It is from the Tertiary shales of Monte Bolca. We are afraid your "centipede" is something else. Could you send us a sketch of it? Consult "Geological Stories." London: Hardwicke, price 4s.

T. Edwards.—We believe your geological specimen is the femur, not the paddle, of a *Plesiosaurus*. Was it discovered in a drift deposit? Many such specimens are found in drift deposits in the eastern counties of England. Your description of the bed in which the bone is said to have occurred answers to that of a drift deposit. If so, the bone had been re-deposited.

H. R. W.—We are much obliged to you for your suggestion, but are afraid it would not be possible at present to publish a separate index of the ten volumes of Science-Gossip. Readers might find in Hardwicke's Catalogue an index of the principal subjects treated upon in each volume, from the beginning.

C. J. Watkins.—We shall be very glad to accept your kind offer of named Exotic lepidoptera, &c.

E. T. Scott.—Your spider's nest from the Cape is evidently that of some species of Trap-door spider (*Mygale*).

M. Y. (Skye).—Your specimen is a marine shell, evidently a *Littorina*, encrusted with a sponge called *Leuconia nivea*. It is a common seaside object. See "Half-Hours at the Sea-side." London: Hardwicke.

Tidwell.—Your specimen is *Tussilago fragrans*, not a British plant, but an introduced species, which is rapidly overrunning the country.

M. H. C. would get every information he requires for the management of a fresh-water tank in "Shirley Hibberd's Fresh-water Aquarium," to be had from any bookseller for about two shillings.

EXCHANGES.

Crystals of Salicine for polariscope.—Send stamped directed envelope to W. H. Gomm, Somerton, Taunton.

For mounted section of Spine of *Echinus*, will give slide of Foraminifera from Isle of Dogs.—C. E. B., 61, Crouch-street, Colchester.

Wanted, well mounted slide of *Uredo fœtida*, or of Eye of Dragon-fly. Will give slide of Cluster-cups on Aconite.—C. E. B., 61, Crouch-street, Colchester.

A quantity of Crystals, mounted, for Polariscope, suitable for Binocular, or for other good Slides.—Thomas Buck, 111, Corporation-road, Middlesborough.

Wanted, specimens of Native Graphite, massive and crystalline, and of Kish. Also specimens of Fruits and Seeds, and their Products, found in commerce, or otherwise interesting.—W. G. Piper, care of F. Sutton, Bank-place, Norwich.

Specimens of British Lepidoptera with other collectors.—Address, W. H. Rean, London Hospital, Mile End, E.

N. Z. W. will be glad to correspond with collectors of Coleoptera in Scotland, Wales, and the south of England, with a view to purchase or exchange of fresh and unset specimens.—3, Bootham, York.

Wanted, Diatomaceous Deposit from Barbadoes; good Slide given in exchange.—Thomas W. Bruce, 26, Wapping, Liverpool.

Skin of *Scyllium*, with angular scales *in situ*, mounted for binocular arrangement, for any good Slide.—A. Haward, 1, Shirley Villas, Addiscombe, Croydon.

For *Tous les Mois*, send stamped envelope and any object of interest to J. G. R. Powell, Brow-Hill House, Leek, Staffordshire.

Rhamni, Populi, Jacobææ, Dominula, Derasa, Batis, Cytherea, Nupta, Cruda, Stabilis, Mensuraria, Bipunctata, Ocellata, Multistrigaria, Progemmaria, Punctaria, Candidata, and others, for Butterflies in good condition.—H. A. M., 39, Leamington-road, Bayswater, W.

Wanted, any quantity of *Dytiscus maginalis*, or other Dyticidæ, alive or fresh-killed, for Dissection, for Micro-slides, Cash, &c.—J. S. Harrison, 48, Lowgate, Hull.

Wanted, fresh specimens of Wild Plants, for those of the British district.—W. E. Green, 47, Park-street, Bristol.

Beale's "How to work with the Microscope," last edition for last edition of Carpenter's "Microscope and its Revelations."—A. J. Blackman, Romford, Essex.

For exchange or otherwise, a first-class ⅛ Object Glass, by Thomas Ross, especially selected for the late owner.—Apply to Rev. J. Bramhall, St. John's Vicarage, near Lynne, Norfolk.

Slides of Micro-fungi, &c., well mounted, for all kinds of Unmounted Material.—J. H. Redgern, Grosvenor-street, Manchester, S.E.

Wanted, unmounted Zoophytes, British and Foreign, and unmounted Parasites; good Slides in exchange.—Edward Ward. Higher Broughton, Manchester.

Orthoseira arenaria, for mounted or unmounted Objects.—P. B., Florence Villa, Crophill, Glasgow.

Butterflies from Borneo and South America, Precious Stones, Minerals, Exotic Shells, for good Micro-slides.—C. Napier, 4, Elgin-road, St. Peter's Park, London, W.

Liberal Exchange in really first-class Objects, for superior Diatomaceous Material from South America, Africa, or Asia, or other really good stuff.—H. B. Thomas, Boston, Lincolnshire.

First-class selected and arranged Diatoms, for other really good Slides, or Diatomaceous material.—G. W., 89, Higher Cambridge-street, C. on M., Manchester.

Wanted, 977, 1037, 1048, 1051, 1105; offered, 969, 970, 1236, 1249, 1310, 1316, 1318, Lon. Cat., 6th edition.—W. J. Hannan, 6, Tatton-street, Ashton-under-Lyne.

Wanted, Ova of Mori, and all other Silkworm Moths; British Lepidoptera will be given in exchange.—Castle Barnes, 1, Priory-terrace, Colchester, Essex.

Marine Algæ, prepared as recommended in Science-Gossip for March, Zoophytes, Mollusca, Diatoms, various interesting Marine and Land Material, for Micro Accessories, Polariscope, &c.—T. McGann, Burrin, Oranmore, Ireland.

Instructions in French or Shorthand (Pitman's), for Assistance in Botany, Conchology, or any branch of Natural History.—Apply G. T. Barker, Abbey Walk, Great Grimsby.

Wanted, British Marine Algæ, mounted or unmounted, for American Algæ.—Address, by Mail, Rev. A. B. Hervey, 10, North Second-street, Troy. New York, U.S.A.

Wanted, good named Algæ, Mosses, Seeds, Parasites, &c., for other good named Objects for mounting.—C. J. Watkins, Painswick, Gloucestershire.

A good selection of Microscopic Slides, for a few cabinet specimens of Fossils from the Old Red Sandstone, Coal Measures, and Eocene.—E. Lovett, Holly Mount, Croydon.

Wanted, Apparatus for the Microscope, for good Slides and Material; also large Cabinet.—W. Tylar, 165, Well-street, Birmingham.

Wanted, Shells, Minerals, and Fossils.—J. T. T. Reed, Ryhope, Sunderland.

Cassell's "Natural History," 4 vols. (unbound), for other books.—Thomas H. Hedworth, Dunston, Gateshead.

Microscopic Slides for others.—Send lists to John C. Hutcheson, 8, Lansdowne-crescent, Glasgow.

Pupæ of *P. Machaon, C. Elpenor, Porcellus*, or Larvæ of any kind, for Imagos or Preserved Larvæ.—William W. Nettleton, Eyre-street, Batley.

Several hundred Silkworms' Eggs for Carboniferous Fossils.—H. H. Ebrall, Canonbury House, Shrewsbury.

About fourteen species of Newer Pliocene and Red Crag Fossils. Lists exchanged. Others wanted.—A. Limebeer, 8, Melvern Cottages, Kentish Town, N.W.

Reversed specimens of the Common Snail (*Helix aspersa*), for an equivalent in Micro-slides.—William Gray, Naturalists' Field Club, Belfast.

BOOKS, &c. RECEIVED.

"Fungi." By Dr. M. C. Cooke and the Rev. M. J. Berkeley. London: H. S. King & Co.

"Proceedings of Literary and Philosophical Society of Liverpool, 1873-4."

"The Western." Parts 1, 2, and 3.

"Bird Life." By Dr. Brehm. London: Van Voorst.

"Land and Water." March.

"Journal of Applied Science." March.

"Monthly Microscopical Journal." March.

"Ben Brierley's Journal." March.

"Les Mondes." March.

"Entomologische Nachrichten." Parts 1, 2, 3, 4, and 5.

"Canadian Entomologist." January.

"The Colonies." March.

SKETCHES IN THE WEST OF IRELAND.

CHAPTER VI.—ARAN ISLES AND GALWAY BAY.

By G. H. Kinahan, M.R.I.A., &c.

At the entrance of Galway Bay, and south-west of Black Head, in the Burren, lie the three isles of Aran: Inishmore, Inishmaan, and Inisheer, the last being four miles from the mainland. As viewed from the hills in the vicinity of Galway, these appear to be five islands, this being due to two low valleys that cross Inishmore; one west of Killcany Bay, and the other south-west of Portmurvy. The last is so low, less than fifty feet above the sea, that Galway-bound ships have mistaken it for one of the channels into the bay, on which account it has received the name of the "Blind Sound." About the year 1640 an extraordinary high wave, probably seismitic, broke on this coast, and ran across the island through the Blind Sound. This wave, possibly, was due to the earthquake mentioned in Mallet's list as having been felt in France, Belgium, and Holland, at 3.15 a.m., April 4, 1640.

The ancient name of Galway Bay was "Loch Lurgan." This name seems to be now obsolete, but the natives of the islands on the north of the bay still call the north sound Bealagh-locha Lurgan—*anglicè*, "the way of Lough Lurgan." The historian O'Fflahertie, in his "Ogygia," mentions that the islands of Aran were once joined to the county Clare, which tradition he seems to have taken from some ancient document; the latter, however, has not since been found. Of late years, however, the present vicar of Aran, the Rev. W. Kilbride, has proved that since the islands were inhabited, the sea must have been considerably lower than at present; as on the south of Killeany Bay he has found, under the Æolian sands there situated, primitive habitations, consisting of cloghans, or beehive-shaped stone houses; fosleac, or flag-dwellings, and other structures, which he has traced to and below low-water mark. In confirmation of Mr. Kilbride's discovery, there are found in Hiar-Connaught, at the north margin of Galway Bay, submerged bogs, over eight feet deep, at low-water of spring tide, that have roots of oak *in situ*, which prove that when the bogs were growing, the relative level of the land must have been at the least fifty feet higher than at the present time. The charts also point to a former connection between the county Clare and the Aran islands,—in fact, everything seems to suggest that the tradition is quite correct, and that since the historical period the sea has risen and formed islands of land that once separated the bay from the Atlantic.

As we are dealing with tradition, we may mention the mythical isle of O'Brasil. This island is said to appear at times, and, according to O'Fflahertie, it is called "in Irish, Beg-ara, or the Lesser Aran, and set down in cards of navigation." That such an optical delusion does sometimes appear, out to sea, is certain, as it has been seen by various persons; among others by the writer of these notes. The island, or rather apparition, was lofty and rugged, similar in outline to Inishturk to the northward, in the county Mayo. The people of Aran say that O'Brasil's island appears only every seven years. To the north-west of Aran, in the open sea, are the skirds (*anglicè*, sea-rocks). These islands and rocks sometimes assume fantastic appearances, sometimes looking like a large city, at other times like a number of ships in full sail, or commonly like great stacks or ricks of corn or turf.

The Aran islands, according to O'Fflahertie, were called, from their shape, "Ara, signifying a kidney." The south sound, or strait to the south-east, between Inisheer and the county Clare, was formerly called Bealagh-na-Finnis, or "the way of the Finnis-rock," the latter being a ledge of rock that extends out from the island. The strait between Inisheer and Inishmaan still retains its old name, while Gregorie's Sound, between Inishmaan and Inishmore, used to be called Bealagh-na-haite, from the hill Benaite, that lies over it on the north-west.

OUR COMMON BRITISH FOSSILS, AND WHERE TO FIND THEM.

By J. E. Taylor, F.L.S., F.G.S., &c.

No. 1.

THERE are few sciences which are more dependent on others than that of geology. Certainly there is none which sends the young student so eagerly to other sciences for assistance. The fossils he meets with in the rocks are far more abundant than he imagined before he began to study geology. Indeed, one of the chief causes of wonder to the young geologist is the abundance of fossil remains within the immediate neighbourhood of his home, unless the latter happen to be on the old granite or metamorphic rocks. He wonders how it is he never noticed them before. Whereas he was blind, now he sees! Fragments, or whole specimens of fossils, animal and vegetable, are constantly turning up before his eager and enthusiastic eyes, either in their parent rocks, or in the Boulder clays and drifts which have been formed out of them. The very rocks of the hills and mountains seem to be almost wholly composed of them—nay, the solid dry land of the globe appears to have been mainly put together by the agency or through the instrumentality of Life! The abodes of all living forms are on the sepulchres of the dead! Existence and extinction are strangely associated together.

No sooner has the young beginner appreciated the wealth of objects by which he is surrounded, or to which he may obtain easy access, than the first fit of *collecting* takes possession of him. His holidays are spent in fossiliferous localities; and his leisure time in reading about them, or in arranging his cabinet. At length he feels the need for more knowledge than he possesses about the many strange forms he comes across. He has an idea they are something altogether different from anything now existing, and a feeling of something like *disappointment* comes over him when he learns that they are constructed on the same plan, and that in many instances, the same generic and even specific forms are still in existence. This state of mind, however, soon gives way to thorough admiration, for he now catches a glimpse of the life-plan of the globe. He sees that, beginning with the lowest and humblest of organisms, it has graduated into the present fauna and flora; that the stream of life, issuing like a rill from such obscure springs as are hardly discernible in the distant Laurentian period, has been gaining in volume and depth as it has passed onward, in unbroken continuity, through all the succeeding ages, until it has opened out in the grand ocean of existing life! Every fossil he picks up is a letter in the great stone book, and many such letters, properly put together, have spelled out some of the most wonderful generalizations that have come before the human mind. For geology as a science is peculiar in this respect, that in proportion to the degree of intellectual labour bestowed upon it, the resulting knowlege is wider and broader than that afforded by any other science, except, perhaps, astronomy. Not only does the new knowledge tell the student of other life-periods besides the present, and extend the duration of the globe infinitely beyond the brief thousands of years he thought it had been in existence; but it convinces him beyond a doubt, that if the present living animals and plants are evidences of Creational wisdom and power, the same may be said of the bygone faunas and floras of preceding epochs. Nay, when he learns to properly connect their nature and distribution with the present, he sees that all are parts or links in the great chain of vitality, of which existing animals and plants are only the continued living forms!

The next step in the process of geological reasoning, which these objects will suggest, is no less interesting or instructive. From seeing how many of our rocks, especially limestones, are wholly formed by vital agencies, the student perceives that the physical geography of every past age is related to the present. The rocks forming the dry land are for the most part of *marine* origin—were formed along the floors of ancient seas, when dry land doubtless occupied the areas of existing oceans! No fact is more readily or surely known than that sea and land have frequently changed places. Upheavals and depressions of the earth's crust, producing marvellous physical results, and affecting the distribution of life-forms in every period of our planet's history, are nevertheless of insignificant importance when we regard the bulk of our earth as a planet. It is the sum total of these depressions and upheavals, as well as of the atmospherical and marine wear-and-tear of the solid rocks, that has eventually given to the surface of the globe its present physical geography.

Of all these things the geological student has to take heed. He discovers that geology, after all, is but the total record of the physical geography of the past; and that, as Lyell and others have demonstrated, the physical changes everywhere going on at the present day, do not differ in their nature, and *probably* not in their *intensity*, from those which took place in former geological periods. But, undoubtedly, the nature of geological study obliges the young beginner first of all to pick up an elementary knowledge of natural history. How can he understand anything of the fossil plants, shells, bones, teeth, &c., he meets with so abundantly in every formation, unless he knows something about similar recent objects? Fossils only differ from their modern representatives in being an *extinct* zoology or botany, instead of an existing one. Thus is the geological student forced to continually widen his sphere of research, and he finds that every additional bit of knowledge of any other natural science helps him all the more to understand that which he has selected as his special hobby.

Geology is essentially an open-air study. It leads a man into the most beautiful of landscapes, to the most charming of scenery. The tame flatness of the plains reveals to him comparatively little, unless coal- or salt-mining has partly turned the earth's crust inside out, or railway cuttings have laid open sections instructive both as regards the strata and the fossils they contain. Boulder-claypits or natural tarns will even here occasionally prove interesting. But to study the stony science in its fulness we must "gang to the hills!" There, where the heather is purplest, and the atmosphere exhilarates like old wine, you are most likely to read off the "record of the rocks!" Healthful activity is necessarily gendered; and the memory is stored with remembrances of sunny days and clear skies, never to be forgotten!

In the course of the following articles we purpose introducing the young student to the "happy hunting-grounds" of our various geological formations. Perhaps some of our many readers will assist in the catalogue of geological collecting-grounds, and any information thus given we shall gladly publish. At the same time, we purpose limiting ourselves to the *common* fossils, unless we are occasionally tempted to mention a few for the purpose of further whetting the appetite. And, whilst we describe the spots where the young geologist is most likely to "make a bag," we propose giving a brief description of the natural history relationships of the numerous extinct organisms.

Commencing with the most lowly organized, we pass over the fossil known as *Eozoon;* first, because its organic nature is still held to be doubtful, although the balance of evidence is decidedly in its favour. "Eozoonal structure," as it is now termed, is not confined to the oldest Laurentian rocks. Professor King has discovered it in the *Ophites*, or metamorphosed Liassic rocks of the island of Lewis. It is also abundant in the green crystalline marbles, of Lower Silurian age, in Connemara, in Ireland. Now, the distribution of *lowly* organized forms can never be safely accepted as indicating the age of a rock. Naturalists are well aware that the most lowly organized animals and plants are just those which have had the widest distribution both in time and space. It is the most highly organized species of animals and plants that best mark the geological ages of formations. So that the fact of finding "Eozoonal structure" in limestones other than the Laurentian, is of itself no evidence against the animal nature of the *Eozoon.*

Even as regards another fossil (named after Professor Oldham), geologists have long been in doubt as to its nature, whether it was animal or vegetable. It is called a *Zoophyte*, an unfortunate designation, which often conveys to illiterate or half-read people the idea that such objects are partly animal and partly vegetable. The name originally was intended only to express their *external* resemblances to plants; but it is constantly twisted to signify a hybrid combination of animal and vegetable characters. As regards the *Oldhamia*—the fossil about which we are now speaking—it has been alternately regarded as a seaweed or a zoophyte. Mr. Salter thought that possibly it was a *calcareous* or limy seaweed, like the common *Corallina officinalis*, which you may find so abundantly in every rock-pool at low-water. The latter is undoubtedly a seaweed; but its limy structure and jointed stem caused it to be regarded by the earlier naturalists as a *Coralline;* whence its name. Professor Edward Forbes believed that the *Oldhamia* showed, at the articulations of the stems, the positions of the minute cells of the zoophytes. The most likely idea is that this very pretty and interesting fossil—the *oldest* organic form with which we are certainly acquainted—was related to the little "sea-firs" that are so abundant nowadays along our coasts. Indeed, not a few of these *Sertularians* (as they are called) resemble in external shape the *Oldhamia.* The dry portion that remains when the zoophytes are dead, is of a *horny* nature, and formed of a substance termed *Chitine.* Now this is one of the most indestructible of animal substances, and is likely to be preserved when others would be decomposed. If the *Oldhamia* had been calcareous, the limy matter would speedily have been dissolved away, and few or no traces of them would have been left. We think, therefore, that the most probable natural history position of the *Oldhamia* is among the *Hydrozoa*, of which the "sea-firs" (commonly mistaken for seaweeds), which you may see so abundantly clustering on the backs of old oyster-shells in any fishmonger's shop, are the most familiar examples. The *Graptolites*, which are so numerous in the Lower Silurian rocks, as we shall presently see, belonged to the same class.

There are two species of *Oldhamia* known to geologists, each distinctly marked from the other.

Both are fonnd in the same locality—viz. the Cambrian rocks of Bray Head, abont fonr or five miles from Dublin. The place is easily reached, and will not soon be forgotten by the geological student. The rocks where the *Oldhamia* occur are beyond the village, and form the sonthern horn of the bay. They are very smooth and fissile, and almost of a claret-colonr. The fossils (which sometimes occur along with the traces of marine worms) seem to lie in zones, for certain strata yield them more

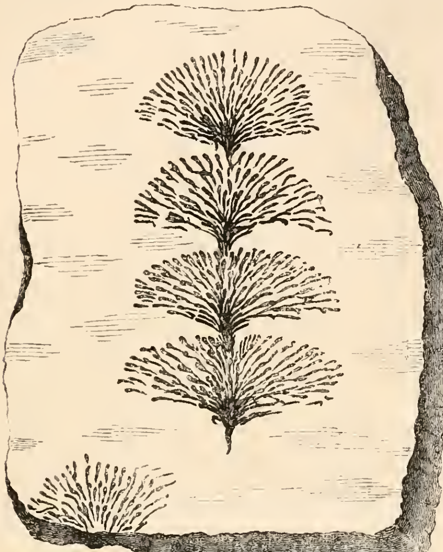


Fig. 61. *Oldhamia antiqua*, the oldest known British fossil: Cambrian Rocks, Bray Head, Ireland.

abnndantly than others. In the neighbourhood of the bathing-place, where the sea-water appears unnsually pure and green in comparison with the claret hue of the rocks, the *Oldhamia* may be gathered in abundance. The species *antiqua* also occnrs in yellowish shales of the same geological age, in Carrick mountain, connty Wexford. Hitherto, both species have been limited to the Cambrian rocks of Ireland, where, however, they do not seem to have a very wide distribution. The other species (*Oldhamia radiata*) differs from that figured in having the setæ circularly radiated instead of being fan-shaped. It is also found at Bray Point, connty Wicklow, and the stndent will readily meet with it there, in the rocks known to all in the neighbourhood as the "Periwinkle Rocks."

Apart from the pleasnre of collecting these neat little fossils, the visit to Bray Head will amply repay the tonrist. It is one of the pleasantest seaside watering-places in Ireland. The zoology of the rock-pools abont the Head is very rich, and the visitor interested in this study and geology might easily spend a few days here. Nor would his pleasure be marred by the demonstrative gaiety of the humble wedding-parties that seem to make Bray their place of festivity. The village is easily reached by rail from Dublin, and we regard it as especially interesting to the geologist as the locality where the "oldest British fossil" may be met with.

ON COBWEB-MAKING.

SOME observations made upon the house spider (*Tegenaria domestica*), have thrown light sufficient to satisfy my own enriosity with regard to the power which all spiders have of ejecting lines of web to a distance. The usual explanation of the manner in which a garden spider will send lines from one object to another, is, that the line is first ejected from the spinnerets, and, floating on the air, is caught by some object at a distance, when the spider avails himself of it as a bridge, strengthening it as he goes along.

As webs are generally formed by the garden spider in the very early morning, or after dark at night, it is exceedingly difficult to watch the process from the first of constructing webs of *Epeira diadema*, the garden spider; but from observing the powers of the house spider I am of opinion that all spiders are able to eject and attach lines of web just where they wish, and that there is nothing fortnitons abont the process. My conclnsions are drawn from the following facts:—

I obtained last year, in the month of February, a cocoon, half full of honse spiders; one end of the soft silken ball appearing quite black with the nnmber of busy spiders hnddled together, while the other half was filled with the empty shells of the eggs from which they had emerged. With the point of a needle I made an aperture in the cocoon, and let abont ten of the creatures free, being anxious to see whether they would exercise their web-spinning power soon after their entrance npon life. It so happened that I allowed them to escape on to a book with a cover which I had laid across the end of a marble mantelpiece; the spiders immediately ran abont, and several let themselves down by lines a few inches from where the edge of the book projected beyond the mantelpiece, as if to reconnoitre, bnt quickly returned again. Suddenly I perceived that from one of the small creatnres, after being for a time motionless, a line of web of exqnisite fineness had been pnt np, at about an angle of 45°, to the edge of a terra-cotta vase which stood on the other side of the book, and was abont ten inches high. The line was taut, and firmly fixed, although so fine. No portion of it hnng over the edges of the vase, which was not ronnded, but angular, and about a fourth of an inch wide, and the web had exactly impinged on and adhered to the outer angle of the rim. The young spider was about a line in length, and the web it had sent up was rather more than ten inches in length, therefore it was evident that these new-born creatures, before being nourished by food, possessed the power of ejecting a line one hundred times their own length, and are able to attach it to exactly the spot they desire, while the matter ejected preserves its stickiness sufficiently to adhere to the spot after its passage through the air. It almost took away my breath to witness the marvel. The spider next ran up the line, carrying with it a second line, attached to the edge of the book. Other spiders followed its example, and soon a lovely band of innumerable silvery threads was formed between the book and the outer angle of the rim of the vase, and extending about an inch and a half round its circumference, the little creatures travelling up and down with incredible celerity and industry until it was formed. Lines were carried across the rest, and here and there short filaments floated out from the main band, or were mingled with it. Then the weavers seemed to rest from their labours, and wait for flies to be entrapped. None came, however, and in about an hour from the time their work was begun, it so happened that a servant coming in to lay the table for dinner, a current of air setting in towards the fireplace, my ten spiders availed themselves of it to get to their more natural habitat, the ceiling, and fastening lines to the edge of the vase, took flight, and like little kites floated up, lengthening the lines as they went, until at last I could descry them safely landed on the cornice of the room. Whether some webs swept down two or three weeks after were of their manufacture I know not, but I had no difficulty in understanding the following autumn how a large *Epeira diadema* had been able to send out a line two and a half yards in length from a trellis to exactly the corner of a projecting balcony, and another from that corner back to the trellis, so as to form an angle within which his splendid, large, wheel-shaped web was formed. Considering his age and size, the exploit was not so wonderful as that performed by my newly-hatched *Tegenarias*.

Will any of your correspondents explain the method of the Epeira in constructing its web, the lines of which crossing at the centre are carried some of them to surrounding objects, while others are fastened to an outer circular line, made evidently before the other circular lines of the woof are formed? Where does the spider place itself when it ejects the lines which form the spokes of the wheel?

From the spider working at his web in the very early morning or late in the evening, it is not easy to watch the progress of web-making from the beginning. That they work after twilight I am assured by a lady, who tells me that in passing down her garden-paths to shut up a greenhouse after dark, she has found cobwebs across her face where there were none a couple of hours before.

Putney. S. W.

BOTANICAL EXPERIMENTS.

In the month of April, 1869, I placed a budded acorn in a small bottle of water, to watch its progress in growth; at length it sent its root down-

Fig. 62. Botanical Experiment. A, first year's leaves; B, second do.; C, piece of card; D, acorn; E, glass phial.

wards and stem upwards, and soon leaves began to appear; it grew now with such rapidity, that it was necessary to remove it into a larger bottle, and as the acorn (which had remained attached to the stem) had shrivelled up, it did not require to be kept under water any longer; the top of the bottle being too large, a circular piece of card-board was placed on the top, with a small hole inserted in it, in order that the stem of the oak-tree might pass through it, supporting the acorn above. It had six full-grown leaves during the first summer, and they gradually began to fall off toward the autumn; as they did so, they were put inside the bottle, so that the root might gain a little more nourishment than from the water only.

The tree remained in a sort of dead state during the winter, but in the spring of 1870 it put forth two fresh green leaves; but being put out of doors, the exposure to the cold air checked it, and it soon withered and died.

During the last year, 1874, I kept another oak-tree in the same way: it had seven leaves during the summer; and being kept in a warm room, it lost none of its leaves through the winter: they remained quite green and showed no sign of decay. Does not this suggest how the oak may become an evergreen tree in warm climates?

Three or four leaves fell off at the beginning of January. The tree sent forth a shoot in the month of March, 1875, which soon burst into leaf; it is shown in the accompanying diagram, with the three leaves of last year's growth, and the four fresh leaves of this year; the old leaves still remain quite green, and it will be interesting to notice how long they will remain on the tree.

The result of this very simple experiment would, I am sure, be a source of interest to any lover of natural history. AGNES LURY.

HOLIDAY RAMBLES.

No. V.—A BOTANICAL RAMBLE IN CORNWALL.

TO leave the hot and dusty streets of London, after a day's work there in summer, for the fresher and cooler air of the country, is always pleasant; but it is still more so to leave them when we trust not to breathe their smoky atmosphere for some weeks to come. Such were the feelings of myself and friend when we took our seats in the evening express train for Cornwall one sultry day last August. My object for going to the West of England was to obtain and add to my herbarium such plants and flowers as are peculiar to that part of England. We left the train early the next morning at Penryn, a station between Truro and Falmouth: our destination was Helston, nine miles distant. It was the hottest day of the year, and we found we had to choose between a jolting drive in an over-crowded omnibus, or a walk in the sun with scarcely a particle of shade. We chose the former. Our road was dull in the extreme. The only pleasing feature about it was the gay colour of the steep banks on either side, covered with heather and hare-bells. We had the honour of carrying Her Majesty's mails, otherwise our progress, slow as it was, would have been still slower. Very glad we were to reach the Angel Hotel, in the High-street at Helston, and to rest and refresh ourselves after our long night journey. In this we were so far successful that the afternoon found us strolling along the banks of Loe pool, towards Penrose woods. This pool of water is the largest lake in this part of England, and is separated from the sea by a steep bank of shingles. The streams which flow into it carry down with them an immense quantity of tin and other ore from the neighbouring mines, and the mud has of late years become sufficiently remunerative to give employment to a number of people who wash it for the sake of extracting its mineral contents. We found Penrose woods delightfully cool and pleasant after our hot and dusty drive of the morning. I there saw, for the first time, the Cornish Heath (*Erica vagans*) growing in considerable abundance, but I was subsequently told that it had been introduced; it is in fact only to be found in its native luxuriance on the Serpentine formation, between Mullion and the Lizard. Some plants of the Great Mullein (*Verbascum Thapsus*), with their thick woolly green stalks and leaves, had almost taken possession of a grass field near Penrose House, and the gorse bushes on all sides were covered with that pretty parasite the Lesser Dodder (*Cuscuta Epithymum*). The yellow spikes of the Golden Rod (*Solidago virga-aurea*) were a pleasing contrast to the bright crimson of the Scotch Heather, with which the banks of our path were carpeted. On the shingle of Loe pool I found several specimens of Strapwort (*Corrigiola littoralis*), a rather insignificant little plant, but remarkable for its rarity, as it only grows in a few other places in England. On the whole I was well pleased with my first day's "bag"; for besides the plants I have named, I obtained several others, more or less rare and new to me. Amongst these were *Tutsan hypericum*, gathered from a large bush in a hedge at Penrose; Portland Spurge (*Euphorbia portlandica*), and the Wild Madder (*Rubia peregrina*). On returning to Helston, I went into a stationer's shop in the High-street to buy some sheets of blotting-paper in which to dry my plants. I was fortunate in my choice of this shop, for the owner of it turned out to be an experienced botanist, and well acquainted with the habitats of the various plants in the neighbourhood. My newly-found botanical friend not only gave me several well dried examples of plants which were not then in flower, but also a list of the rarer plants on the Lizard, and the places where they were to be found. I ought here to mention that no one who wishes to visit the Lizard, should do so without procuring Mr. John's charming little book, entitled "A Week at the Lizard," published by the Christian Knowledge Society: I found it of great assistance to me; and I should have missed obtaining many plants had I trusted to my own powers of vision only. A card-table in our room at the hotel served as a capital press; but I am afraid the use of it for this purpose, although perhaps in one sense more harmless than its ordinary one, was very trying to its hinges.

Helston itself is a pleasantly-situated country town, about equidistant from Penzance, Falmouth, and the Lizard, and is therefore much used as a halting-place by visitors to any of these places. The High-street presents a busy scene on the arrival of the coaches, which during the summer months, and at all events when we were there, were crowded with passengers.

Our next expedition was to Gunwalloc, a little hamlet a few miles south of Helston and close to the sea. My friend had preceded me to sketch, and I followed him in the course of the morning. I was anxious to visit Gunwalloc, as, from the description of it and its botanical rarities in Mr. John's book, I expected to make many additions to my herbarium; and in this, as will be seen, I was not disappointed. I found my friend seated in a delightful little hollow in the cliff, sketching Gunwalloc church and headland. The steep banks near us were covered with masses of the Sea Aster (*Aster Tripolium*), its lilac corymbs lighting up the dark-green stems of that rare, but to my mind ugly plant, the common Herniary (*Herniaria glabra*); on the beach I found Henbane (*Hyoscyamus niger*) and Prickly Saltwort (*Salsola Kali*) in great abundance; neither of them rare plants, but of sufficient interest to me to add several specimens to my collection. In Gunwalloc churchyard were numerous plants of the dark Mullein (*Verbascum nigrum*) in all stages of growth, from plants three or four feet high in full flower, to little seedlings scarcely showing above the ground. After a ramble in the immediate neighbourhood of Gunwalloc, my friend and I, towards the middle of the day, began to think of luncheon, and to that end made our way towards Mullion Church town, about a mile distant; and a most pleasant walk we had. It was a lovely day, and the views were very extensive. On the right hand we could trace the coast almost to the Land's End; on the left were Mullion Island and the cliffs near the Lizard Head, with numerous ships passing up and down Channel. The short turf on which we were walking was almost blue with the Autumnal Squill (*Scilla autumnalis*) intermixed with Lady's Tresses (*Spiranthus autumnalis*). These plants were in great abundance throughout the Lizard district, the one remarkable for its bright colour, the other for its fragrance. I was told that the Vernal Squill (*Scilla verna*) was in even greater abundance in the early part of the year, and that the flowers were more striking and larger than the Autumnal Squill; but of this I was unable to judge. After luncheon at Mullion, we again turned our steps to the sea, following the course of a little stream to Pollunan Cove. My only botanical discovery on the way was a plant of the Viscid Bartsia (*Bartsia viscosa*), growing in a small swamp with Spiked Lythrum and other aquatic plants. It has, as its name imports, a sticky, gummy flower and stem; the flower is of a bright yellow, and is very pretty when freshly gathered, but of a most unsatisfactory appearance when dried. Leaving my friend to make another sketch, I returned to Gunwalloc to hunt up the stream and marsh for aquatic rarities. On the way I gathered specimens of the Sea Convolvulus (*Convolvulus Soldanella*), a pretty trailing plant with light pink flowers; Brookweed Samolus (*Samolus Valerandi*), and Dyers' Genista (*Genista tinctoria*), which I was not acquainted with in its stunted form. There were other stunted forms of plants on the storm-beaten cliffs of the Lizard; amongst these I particularly noticed the Meadow Spiræa. My search up the stream at Gunwalloc was principally directed to obtaining specimens and roots if possible of the large Spear Ranunculus (*Ranunculus Flammula*). After walking some distance up the stream, I saw a bright yellow flower upon a stem about four feet high, which I at once recognized as belonging to the plant I was in quest of; but to secure my prize was easier said than done, for it was growing in the middle of a deep swamp surrounded by reeds and rushes. After a great deal of trouble, I managed to make a sort of raft of rubbish to step on, and with the help of a stick I dragged the plant near enough to me to cut off the flower. I returned to Helston loaded with plants, and well satisfied with the day's excursion.

The next day we left Helston to take up our quarters at Lizard Town. We drove over to Mullion, and then walked along the coast by way of Kynance Cove. Unfortunately, the cove was invaded by a steamer with excursionists from Penzance, a great many of whom landed; so we could not enjoy the beautiful coast scenery as we should otherwise have done. On arriving at the Lizard Lights, we found a sale going on of the cargo, spars, and rigging of an Italian ship, which had run on shore in a fog a few days before. The hull was sold as it lay on the rocks, and a steam tug had been at work for some days trying to get her off. During the night after the sale, after the tug had left her, she took herself off, and went calmly floating away towards the Land's End. Had not one of the Lizard fishermen seen her early the next morning, the purchaser would have lost his bargain; as it was, the fisherman boarded her, and remained with her till the tug came and towed her into Falmouth. It is to be hoped the said fisherman was well rewarded for his trouble. The sale took place on the edge of the cliff, under the lighthouses, almost within sight of the wreck. The luckless ship's cargo, which consisted of barley, was spread out on the turf to dry, and her spars and rigging arranged round it in "sundry lots." It was just concluded when we arrived; but the purchasers, principally weather-beaten fishermen of the neighbourhood, were still examining and talking over their bargains.

Lizard Town consists of two or three inns, and a few other houses and shops, the latter being chiefly for the sale of serpentine ornaments. Its situation and appearance is dreary enough, and were it not for its proximity to the sea, or many objects of interest to the tourist, no one would stay there longer than he could help.

I was fortunate in obtaining several new plants for my collection, in the immediate neighbourhood. On the banks of the brook near Landewednach Church, Sweet Cyperus, or Galiugale (*Cyperus longus*), grows in considerable quantities. It is a very graceful plant, with long streaming leaves and a triangular stem. At Caerphyllian I found another of the sedge family, the Prickly Cladium (*Cladium Mariscus*), a tall, handsome, rush-like plant, but wanting the elegance of the Sweet Cyperus. Both of these sedges are very local, and rare in Britain. One day we walked to Cadgewith, a little fishing village a short distance from Lizard Town. The heaths were in full magnificence of beauty, and on all sides were masses of them. The *Erica vagans* was, perhaps, the most abundant, but *Erica tetralix*, *Erica cinerea*, and the commou Ling, were all growing within a short distauce. Ou the cliffs at Cadgewith we saw thousands of our old friends the pretty little Autumnal Squills, the Rare Clover (*Trifolium Molinerii*), then in seed, the Wild Asparagus, with its dark-green foliage, and Butcher's Broom (*Ruscus aculeatus*). There were several other rare plants to be found in the neighbourhood of the Lizard, which I was not able to gather myself, some being out of season, and some not coming in my way; but through the kind assistance of my botanical friend at Helston, I was able to add many to my collection. Of these, I may mention the following: *Allium Schœnoprasum*, from the Rill Head, Lizard; *Physospermum Cornubiense*, from Bodmin; Hairy Genista (*Genista pilosa*), *Trifolium scabrum*, *Illicebrum verticillatum*, and *Erica ciliata*.

The following week we left the Lizard, for Penzance and the Land's End, and although neither of the latter places is quite equal to the Lizard for botanical treasures, I never came home after a day's excursion without some plant of interest. On St. Paul's Hill, Newlyn, I found the palm-leaved Scrophularia, a plant much resembling the Water Scrophularia, and chiefly distiuguished from it by the shape of its leaves. On the way to Madron, Sweet Alyssum (*Alyssum maritimum*) was growing on a stone wall, far from any human habitation, in considerable quantities; a plant much cultivated iu flower-gardens, and well established as a weed of cultivation in this part of England. The stream near Madron Well was full of the Marsh Hypericum (*Hypericum elodes*), with its pale-yellow flowers and woolly whitish stem and leaves. The beach between Marazion and Penzance is well worth a visit. The Horned Poppy (*Glaucium luteum*) there grows iu great abundance. I found it a most difficult plant to press satisfactorily; in fact, its flower-petals are so fugacious that it is almost impossible to bring it home if the bud is at all opened. Here I found also Sea Cuticle, Sea Glaux, and Sea Spurge, all of them tolerably common maritime plants, but well worthy of note by an inland collector. One plant I picked on the beach I was quite unable to name. It subsequently turned out to be *Neslia paniculata*, a chance visitor to our shores.

I have now mentioned the names of most of the rarer plants to be found in the Lizard and Land's End district, and I think all will agree that the list is a tolerably numerous one. I am quite sure no lover of the works of nature could spend a fortnight with greater pleasure than in this part of England. Neither need he have botanical tastes only; for the geologist there is an abundant field among the serpentine rocks of the Lizard and the mines near the Land's End. For the ornithologist, there are many rare sea aud other birds, whose habits he may observe, and whose haunts he may visit. There can be seen that much-persecuted bird the Cornish Chough. We met with specimens on two occasions; once near Portleven, where we saw a single bird, and afterwards at the Land's End, where we saw two. On both occasions they flew within a few yards of us. For those who are fond of sea-fishing, let them anchor some fine evening for an hour or two in Mount's Bay, with a good store of patience and odoriferous herrings for bait.

Pinner Hill, Watford. W. A. T.

TWO MUD-LOVING FISHES.

(An Aquarial Study of their Colour and Certain Habits.)

By Dr. C. C. Abbott.

THERE are some fishes that always interest me, wherever I may chance to see them. Even if on the stalls of the fish-market, I single them out, when perchance I catch a glimpse of one among the piles of small fishes. Particularly is it so with the percoid here described and figured, which is well named the "Mud Sunfish;" for indeed of all thick, sluggish, and uninviting spots, those mostly frequented by this fish take the lead. I have said as much concerning the Mud Minnow (*Umbra limi* of Gunther's "Catalogue of Fishes," vol. vi. p. 231), and truly. The fact is, the two species are very frequently associated, but the minnow being, even when of maximum growth, the smaller fish, it can thrive in shallower waters.

February 22nd of the present year I went fishing in a small stream fed by several large springs. At this time it was quite clear of ice. The catch was, with minnows and pilse, three fine specimens of *Ambloplites pomotis*, which I successfully transferred from the net to an aquarium, and since then I have been making them the subject of an especial study. Associated with them in the tank are several mud minnows, and to preserve the water I have two bunches of river-weed (*Myriafilum obtusum*).

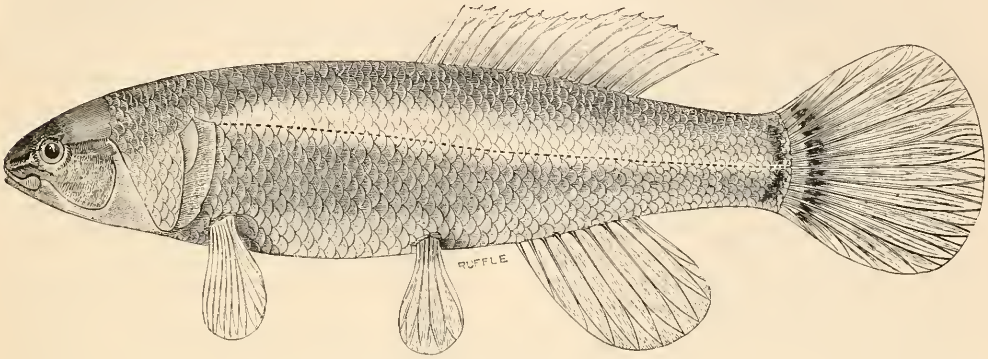


Fig. 63. Mud Minnow (*Melanura lima*), nat. size.

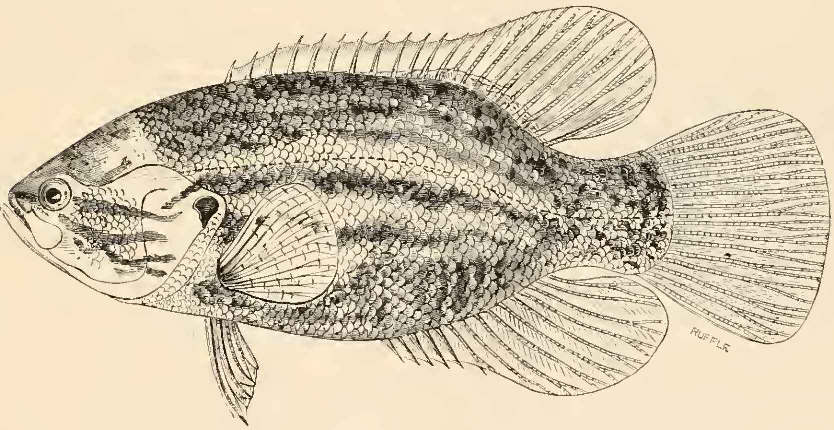


Fig. 64. Mud Sunfish (*Ambloplites pomotis*), two-thirds nat. size.

When taken from some mud-hole, the Mud Sunfish is a dull dirty brown and black creature, with no trace of beauty in colour, and but little in form; but he is not in reality so ill in appearance as he seemed at first. This our illustration shows.*

* This sunfish was first described by Prof. Baird, who gives as the colour, "dark greenish-olive, with three or four irregular longitudinal bands of dull greenish-yellow, and occasionally cloudy spots of golden green." I have never seen a specimen precisely answering to this description.

At the very outset, let me say that one would hardly recognize these fish in the clear, cold water of the aquarium as compared with specimens fresh from the mud of their weed-grown homes. Instead of a dark dull brown, with dingy black bands, they are (*i.e.* my three specimens) really a bright chestnut-brown, with a golden tinge, and with markings of quite a glossy black, showing in some lights a rich purple tint. The head has always a decided metallic lustre, and the fins are orange. (Prof.

Baird gives "very dark greenish-olive, with darker margins.") Certainly we have not given the description of an ugly fish; but while these colours now obtain in the specimens in my aquarium, it is not proper to give the impression that such is the actual colouring throughout the year. Before summer has passed by, these more brilliant tints will be materially dimmed; still it is true that if kept in clear cold water, in which they will thrive, they preserve to a greater degree the colours that now characterize them than when in muddy waters; and here also is, I judge, the reason why the specimens I have seen invariably differ from the description given by Prof. Baird. His specimens were taken from Cedar Swamp Creek, Cape May Co., New Jersey; and the difference, which is very marked, in the water of that stream as compared with Crossweelssen Creek and its tributaries, fully explains the variation in colour of the specimens from the two localities.

My aquarium specimens are now in their nuptial dress. The bright tints are those that sexual selection has gradually developed; and as I watch the two males chasing each other to and fro, and "showing off" before the passive female, I think I can see the value of colour in the vexed question of a species origin.

Except when the coming duties of the care of offspring force them from their retreats, the Mud Sunfish is dull and uninteresting. Although quite capable of executing graceful manœuvres, and of excellent swimming powers, it still seems most to delight in maintaining a perpendicular position, with its tail up, half hidden in the river-weed, and without any perceptible motion. I have noticed one of my specimens retaining this head-down and tail-up position for forty minutes; and then, when driven from his bunch of weed, he swam about very listlessly, and resumed it as soon as I would let him. This same position is also a favourite one with the mud minnows, as we shall see when treating of that fish.

Occasionally I have gone to the aquarium to watch the fishes for a while, and lo! every tint was different from that last seen. Several times the two males (as I believe them to be), instead of being chestnut-brown and black, were dull yellow, with pale brown bands. On forcing them to swim about for several minutes, I could bring back their colour; but it proved to be with them, as sometimes with children, when a good lively romp brings the colour to their cheeks; it soon faded away, and the pale tints only showed. The day following the deeper colouring usually had returned.

One word with reference to the vocal powers of this species, and we will consider the Mud Minnow with reference to its habits and colour. I have several times noticed, but with no surprise, that the *supposed* male sunfish I have described uttered prolonged grunting or "whirring" sounds when chasing each other. This noise is not made when they are at rest, as near as I can tell, but while in rapid motion; and, if I am not deceived, the noise is accompanied by a forcing out and sudden collapse of the gill-covers, followed by a stream of minute bubbles of air. I have been usually baffled in my attempts to see the movements clearly, both from the rapidity of the motion, and the fact that the sounds are only made at the close of day, when the light is comparatively dim. The male chubs (*Lemotilus rhotheus*) during the spawning season utter similar sounds, and also the white catfish (*Amiurus albidus*). As I have many notes bearing on this subject, I propose to use them in a separate article, and return to the proper subjects of this.

The well-known and very abundant Mud Minnow (*Melanura limi*) presents us with a second marked instance of the changeableness of the colours that ordinarily characterize the fish. In the aquarium I have five healthy specimens, and they have never exhibited uniform colouring. The female that I have figured, having the abdomen nearly black and the back pale brown, is in what may be called the normal colouring. The others vary in different degrees from this coloration, the extreme being a small specimen, with the whole body below the lateral line silvery white, and above the line pale greyish-green, the deepest tints the most faded, and there is no trace of any colour in the fins. This specimen is, undoubtedly, in full health, if one can judge from its movements and general vivacity, and has varied less from this colouring than have the other specimens from theirs.

This variation in the colour of these fishes—and it is not confined to these two species by any means—is, I am satisfied, under the control of the fishes' to the extent of deepening and paling the *darker* colours. I have noticed particularly that the two male sunfish, when chasing each other about the aquarium, will frequently open their gill-covers to their widest extent, and puff themselves out, as it were, by drawing in a full breath, and then rush at their antagonist. With this gill movement the colours invariably deepen, growing dim again as the fish draws back for a second attack. It is at such time, occasionally, that one may hear the whirring sound I have mentioned.

Like the Mud Sunfish, this minnow loves to rest quietly in bunches of river-weed, and whether head up or down, seems to make no difference. Occasionally the larger bunch of this weed in the aquarium will have one of the sunfish and two or more of the minnows in its branches, giving the group the appearance of a tree with birds resting on its boughs.

There are several interesting points connected with the life history of this minnow, which I cannot now dwell upon, but will conclude with a brief reference to its mode of swimming. It, I may say, always carries its pectoral fins at right angles with the body. These fins are constantly in motion when the fish is moving about, while the posterior half of the dorsal fin *only* is in motion, in connection with the tail, as the guiding fins. The ventrals do not seem to be used at all when the fish is swimming, but, with the pectorals, are used as *legs* when the fish comes to a rest on the mud or any smooth surface. I have frequently watched them slowly settle down upon the smooth sand in the aquarium, with the tips of the pectorals and ventrals just touching the surface. The folded anal fin was close to the body of the fish and scarcely noticeable. In connection with the position of the body and fins above described, I must mention a constant habit of curving the body, sometimes doubly like a letter S, and more frequently like a J. When in such a position, with the fins utilized as legs, one is forcibly reminded of a salamander, or that link between them and fish, and I doubt not myself but this use of the fins, together with this habit of curving the body, and preference for liquid mud rather than water, all are initial steps of an upward movement, which we correctly call evolution. If it is not permitted us to see the complete evolutionary process of the origination of a new species, I cannot but think a careful student of Nature will catch an occasional glimpse of it in the varied phases of life that constantly surround him, if he but make the effort.

Trenton, New Jersey, U.S.A.

REMARKS ON ACTINOPHRYS SOL.

By James Fullagar.

THE *Actinophrys Sol* is one of a remarkable group of Protozoa. It has a circular figure, but the distinctive peculiarity of its figure is due to the filaments or tentacles, which radiate from all parts of its surface, and give the creature, to employ a familiar and not inapt illustration, the appearance of a ball of cotton stuck thickly over with needles, points outwards. These tentacles or filaments are usually pretty regularly and uniformly distributed over the entire surface, and in shape taper from the base to the apex. The tentacles exceed in length the diameter of the body, and at times are rendered so rigid that animalcules moving rapidly through the water, coming in contact with them, become entangled by or impaled on them. When this entanglement has not taken place, even the larger infusoria, on coming accidentally within their reach, start back with the greatest rapidity, sometimes even dragging the *Actinophrys Sol* a considerable distance with them.

I had often seen these beautiful minute creatures in the cells, where I had other objects of interest under observation, but never supposed that there was so much in the study of their economy to render them so interesting. I had seen numbers of them with their bright rays or spines extended,—very pretty objects they were,—and on some occasions had seen their manner of absorbing their food, consisting of small bodies of various shapes; but in this instance I was surprised to see that they were able to seize and to swallow, or more properly to absorb, a living animalcule longer in its body than their own diameter, and to make use of their spines or tentacles to secure and hold their prey in a way that would bespeak a sort of intelligence far above what we could expect in such a creature. For though the Sun-animalcule was a large one, yet the animal it had seized was large and powerful, and in its struggles for liberty twisted and turned the *Actinophrys* half round backwards and forwards. The violence thus exercised appeared sufficient to break the delicate tentacles by which it was being held, or to drag it away altogether. This the *Actinophrys* appeared sensible of, and in order to prevent such a thing, it drew together a number of the spines or tentacles, and brought the united points of them in two different places, and fixed them tightly to the glass. The spines appeared to amalgamate and form into two large cone-shaped spines (fig. 66, *a a*), the tips of which were flattened on the glass and bent to and fro as the prey struggled to escape.

It is evident there is something that renders the tentacles so powerful as to hold on to bodies or other substances so firmly; whether from some sticky matter exuding from them, or from the presence of hooks or barbs upon them, is not apparent. Another thing observed was, that sometimes when an infusorian, in its travels through the water, accidentally became entangled with the tentacles, it for a moment appeared paralyzed, and ceased to move; but in a few seconds it began slowly and gradually to recover from the shock, and finally made its escape from the tentacles. This can be accounted for only on the supposition that the *Actinophrys* was not hungry, or that it was not the proper food, and so rejected it.

In fig. 65, *b*, the *Actinophrys Sol* is shown in its usual form, and also (at *c*) the first contact of an infusorian with its tentacle, when the struggle for liberty on the one hand, and for a meal on the other, commences. The *A. Sol*, in this instance, had seized a *Melopida Lepachella*, which put forth all its power to disengage itself from its relentless foe; but for all the efforts of *Melopida* to escape, it still gradually approached the surface of its destroyer (fig. 66, *d*). The food being thus far conveyed by the action of the tentacles to the surface of *A. Sol*, the spot thus reached becomes slightly depressed, it gradually becoming deeper, as the victim is slowly absorbed into the body. A small animalcule will thus be wholly enclosed in a short time, and the usual form of the Sun-animalcule be speedily restored. But the absorbing of so large an animal as the *Melopida* would alter greatly its

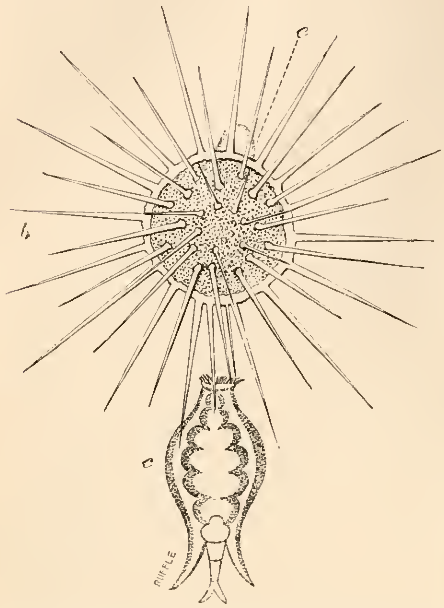


Fig. 65. *Actinophrys Sol*, usual form. *c*, first contact of *Melopida Lapachella* with the spines ; *e*, contracted vesicle.

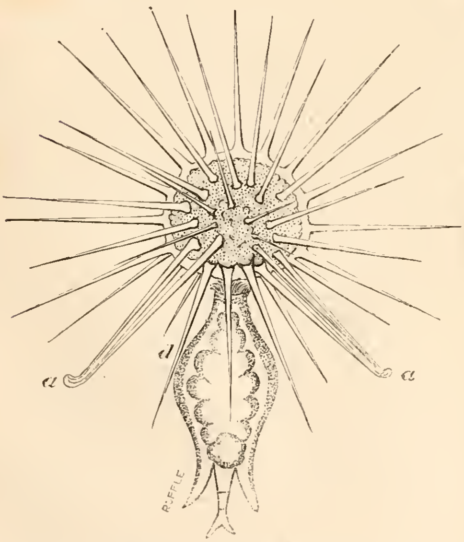


Fig. 66. *a a*, spines united together and fixed to the glass; *d*, *Melopida* drawn to the surface.

form, as shown in fig. 67, where the *A. Sol* appears to be almost divided into two by the large body absorbed. If the object thus received into the body is of a soft nature, it is soon digested and dissolved ; but when covered with a case or shell, a much longer time is required for its dissolution, and this one in question did not discharge the empty case or lorica for more than twenty-four hours after its absorption. It was then thrown out from the *Actinophrys* in the act of fission, when the empty case of *Melopida* floated away perfectly clear and transparent (fig. 68). Two perfect *A. Sol* were the result, but previous to this two others had been separated from the same by fission during the twenty-four hours it had been under observation.

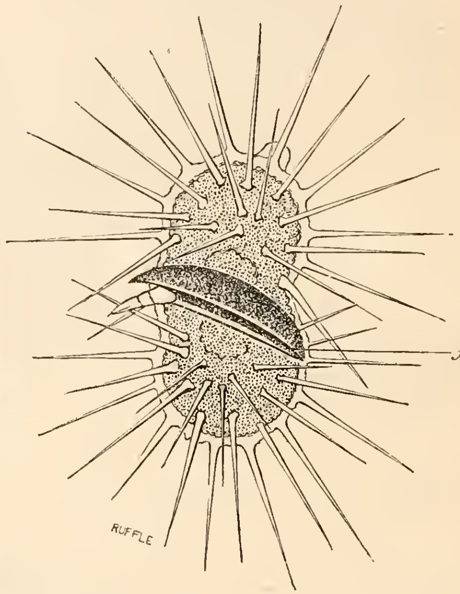


Fig. 67. *Melopida* completely absorbed.

The manner of reproduction or multiplication of the *Actinophrys* is by fission or self-division. At first there appears a deep depression above and

Fig. 68. Lorica of *Melopida* rejected.

below, not far from the centre of the body. This depression as it increases throws the tentacles across each other (fig. 69). As division proceeds, the two animalcules steadily but rather quickly increase the distance between them, until the connecting medium is apparently a long membranous neck, which ultimately diminishes into a single cord, thus becoming gradually more attenuated until it finally separates, and the two are perfected. The complete division from the first indenture to the final severance occupied about thirty-five minutes. All the *A. Sol* have what is termed a contractile vesicle (fig. 65, *e*). This is never still, day or night, but is continually but slowly swelling up. When at a certain height it suddenly collapses and disappears, but only for a short time, when it again swells and again collapses, occupying from ten to thirty seconds in its development.

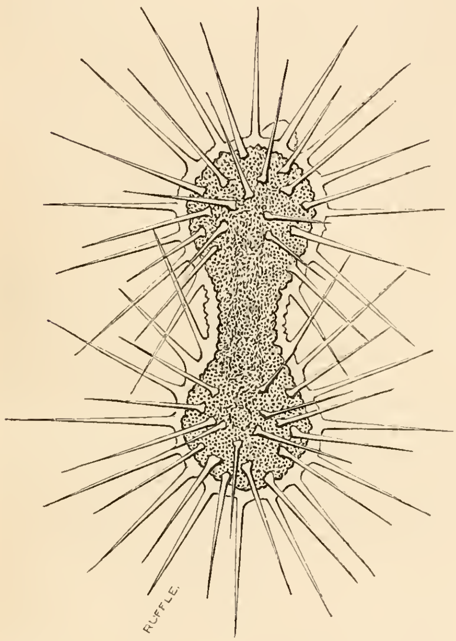


Fig. 69. Spines crossing in the process of self-division.

The mode of nourishment in these minute creatures is a subject of the highest interest, for they live on solid nutriment, and reject such parts as are indigestible. They feed on infusoria of all kinds, and the lower algæ, such as the diatomaceæ, and on crustaceæ.

I have had the *A. Sol* under observation for more than two months, and have seen and noted some very interesting things concerning them, which, if acceptable to the readers of SCIENCE-GOSSIP, will form the subject of another communication.

"The diffusion of Christian knowledge insures the progressive advancement of man in those high moral and intellectual qualities that constitute his true dignity."—*Mrs. Somerville's "Physical Geography."*

MODE OF SEARCH AND CAPTURE OF SPIDERS.

By the Rev. O. P. Cambridge.

WITH regard to the search for spiders and their capture, it might almost be sufficient to say search everywhere, and capture in every possible or practicable way; but still it may be useful, as the result of experience, to make a few more detailed remarks upon those heads. There is scarcely any conceivable locality but what some species or other of spiders may be found in it, and therefore none should be set down *à priori* as unlikely, or not worth a close examination; among many other favourable localities, however, may be mentioned, particularly, loose bark of trees, under which numerous species conceal themselves by day, and many others dwell entirely, forming underneath it their snares and egg cocoons; beneath stones and detached pieces of rock myriads of spiders dwell; in this habitat are found many of the Drassides, a numerous, and, though generally plainly coloured, exceedingly interesting group; among rubbish and heaps of *débris*, wood, brickbats, or what not; beneath and among cut grass, and rushes or reeds which have lain some little time after cutting; also among grass or other herbage, near its roots, numerous species seldom to be seen, and rarely procured elsewhere, live and secrete themselves; also among mosses, lichens, and dead leaves, may be found many minute spiders, not to be obtained except by a careful search among such materials. Water-weeds and *débris*, collected in marshes or on the borders of ponds and streams, are also most favourable for the hiding-places and habitations of many peculiar species seldom found in other localities. I have not mentioned such obvious habitats as trees, bushes, blossoms of flowers, the general surface of the earth, rocks, and stones in every locality, houses, and old buildings of all kinds, outer walls of houses, palings, tree-trunks, &c. &c.; in all these, spiders force themselves upon the collector's attention, but in the others before-mentioned they must be searched for carefully, and often painfully. Some spiders again (though of small size) are quasi-parasitic, living on the outskirts of the webs of larger species. Those at present known consist of a single genus, or perhaps two genera, of which several species have been described, and others are known. They are of the genera before-mentioned—*Argyrodes* and *Ariamne*. These inhabit the webs of large Epeïrids, and appear to live on the smaller insects caught in them; probably also spinning their own irregular snares among the larger lines of the geometric web. The webs, therefore, of large Epeïrids, especially of those which live in colonies like the *Epeïra opuntiæ* of Europe and Asia, should be searched very narrowly for these curious and beautiful little spiders, otherwise they, as well as their long-stemmed, pear-shaped nests, will probably be overlooked, or perhaps considered to be only the young of the Epeïrids in whose web their domicile has been taken up. All the kuowu species of this little parasitic group are more or less metallic in their colours and markings; their legs are long and very slender; the cephalo-thorax of the male is generally very remarkable in its conformation, and the abdomen also frequently takes some eccentric shape.

The search for spiders has this advantage over that for insects in general,—spiders cannot escape by taking wiug, though I have more than onee lost a valuable but minute specimen which has floated away from me successfully on its silkeu line; but for the very reasou that spiders are more sedentary, or often moving down on the surface of the earth, it requires perhaps greater diligence and attention to become a very successful collector of spiders than of insects. One rule the collector should observe as much as possible, and that is, not to capture spiders with the fingers if it can be avoided, for some spiders in tropical countries will infliet severe injury by their poisonous fangs, and others, especially minute ones, will receive injury to the delicate spiues, as well as to the hairs and pubescence, upon whieh mueh of their colour and speeific character often depends. At times, of course, where it is a question between losing and obtaiuing a specimeu, the fingers must be used; and practice makes perfeet even in this mode of capture. It is often impossible to eapture minute spiders quiekly without wettiug the finger and laying it lightly upon them. The spider adheres for an instaut, during which the finger is applied to the opeu mouth of a bottle of spirits carried in the poeket, and the spider is at once immersed. Wheu a spider is seized iu the fingers, it should always be an endeavour to get hold of it by at least two legs, for oue leg would most probably be thrown off by the muscular power which spiders can exert at will, provided they have sufficieut free motion. Collectors often complain of the brittleuess of spiders' legs, but in most cases it results from the instinct of self-preservation, whieh teaches the spider to give up something rather than lose all. I have seldom found that spiders can throw off their limbs if held by two of them at once. An easy and good way of capturing spiders at rest is with a pill-box; the bottom in one hand and the lid in the other encloses them quickly and safely; for spiders running on the ground, or on walls, or trunks of trees, an ordinary entomological hoop-net is most useful. The net is placed (if on the ground) in front of the spider, and with the disengaged hand it is easily guided or driven into the net, whenee it must be boxed into a pill-box, like an insect. If the spider is on a wall (no easy place to capture a spider by any other means) the net is held underneath, and theu with a twig in the other hand it is dexterously jerked or flipped off into the net. The moment a spider is seen on a wall, or tree-trunk, or other similar situatiou, the net should immediately be placed beneath it, as many spiders drop off the instant that dauger even approaches, and would probably be lost entirely if there were bushes, or herbage, or roeky and brokeu ground below. The hoop-net is also most useful for beating bushes and boughs of trees into; but perhaps for this purpose, and for shaking moss, cut grass, aud *débris* into, nothing is superior, or iu fact equal, to a very large common (but strong) cotton umbrella—a regular Sarah Gamp. The hoop-net is, however, the best for sweepiug amongst long grass, rushes, or herbage of every kind, for upon such spiders usually abound. Spiders which spiu a geometric web very ofteu live in it, or close by, and yet can seldom be secured unless, as a preliminiary, the net or umbrella be placed well underneath before the examinatiou of the web is begun; but by taking this precautiou the tenant usually drops in and is secured at ouce.

According to some or other, then, of the above modes of eapture, the spiders will be safely seeured in pill-boxes of various sizes, but never more than one spider in a box, for obvious reasons. A drop or two of chloroform, allowed to run inside the very slightly opened lid, stupefies the inmate in a few moments, when it may be minutely examined, its colours noted, &c. &c., and then dropped into the wide-mouthed bottle of spirit of wine carried in the pocket, or tied to the button-hole by a short string. To preserve an accurate record of localities, &e., it is perhaps advisable to write a memorandum iu pencil on the lid of the pill-box at the time of capture, and to defer chloroforming and putting into spirits until the day's collectiug is over, when notes may be entered from the lid of each box into the note-book at leisure. The spiders can then also be placed in separate tubes, or portions of tubes, of spirit, divided from each other by a small dividing layer of cotton-wool, and each with a little uumber written on parchment, and slipped into the tube with it, referring to the numbered notes in the note-book or colleeting-journal. In absence of chloroform, brimstone will stupefy spiders, or they may be plaeed over (but not in) boiling water. Spiders again may be (like Coleoptera) collected into a wide-mouthed bottle in which chopped laurel-leaves or blotting-paper slightly saturated with prussic acid have been placed, from which they can be removed and plaeed in spirit at the eud of the day. Spiders of large size, especially those with soft aud tumid bodies, preserve their form and colours best if kept prisoners for a few days without food in the pill-boxes. During this time they discharge a great deal of the crude contents of the abdomen, which would have rendered their ultimate preservation, even in spirit, doubtful.

Mode of Preservation of Spiders as Cabinet Objects.

Beautiful as are the colours and markings of numbers of spiders, especially of those found in the Tropics, yet it is not easy to make good-looking, sightly cabinet objects of the Araneidea; and hence, perhaps, more than from any other cause, this order is, in comparison with the insect orders, almost wholly neglected. It is possible, however, to display a large proportion of them very satisfactorily, if care and dexterous manipulation are used. This may be effected in more than one way. Many species, whose abdominal integument is strong, and pretty thickly clothed with hairs, or hairy pubescence, may be pinned, dried, and set out like insects. The abdomen may in some cases be simply opened from beneath, and, after the contents are extracted, stuffed with the finest cotton-wool; others may have the abdomen inflated with a blowpipe after its contents have been pressed out, and then rapid drying prevents the obliteration of colour and markings. But the best way to preserve both colour, markings, and form, for scientific purposes (and with some little extra care and trouble, for cabinet objects also), is to immerse and keep them in spirit of wine, or other strong spirit. The late Mr. Richard Beck, of 31, Cornhill, London, communicated to me a method of preserving spiders in spirit, by enclosing them within a flat under-glass and a concave upper one, the two being cemented together with gold size. The spider has to be set out (in spirit) in a natural position, until the limbs are tolerably rigid; it is then laid on its back in a thin concave glass, like a watch-glass; this glass must be sufficiently large just to receive legs and all without cramping them, and deep enough to allow the spider just to be free, when a flat glass is laid on the concave one. When the spider is laid in such a glass on its back, the glass is as nearly as practicable filled with spirit, and the flat glass, which may be square, and a little larger all round than the other, is sized down upon it. The spider may then be seen in every direction, and it looks, in fact, like a living creature, swimming inside. The objections to this mode are its comparative costliness, and the impossibility of avoiding the inevitably enclosed air-bubble; as regards the latter, however, its presence might be rendered harmless by slightly tilting the whole in the cabinet drawer. This fully presents the spider to the eye, and frees it also from contact with the air-bubble. Spiders, however, so preserved, are sealed up from all higher scientific purposes, such as the minute examination, under a strong lens, of special portions of structure, and their often necessary dissection.

Another mode, which I have practised successfully myself, is far easier, less costly, and leaves the spider free for any scientific investigation, while it is yet made a pleasing object for ordinary observers. My *modus operandi* is first to catch the spider in a pill-box; it is then rendered motionless in a minute or two by a few drops of chloroform allowed to run into the box through the slightly-opened lid. When perfectly insensible, it is set out and secured in a natural position on a piece of wood or cork, by means of pins placed wherever needed (except *through* any part of the spider); the whole is then placed in a shallow jar, deep enough, however, to allow of sufficient spirit being poured in to cover the spider completely. The jar is then covered over, and allowed to remain undisturbed until the limbs have become sufficiently rigid, by the action of the spirit, to allow of the removal of the pins without affecting the natural position of the spider. This will take place in a week or ten days, more or less, according to circumstances; the longer it is allowed to remain, the less chance there is of the legs curling up afterwards. When removed, after the limbs have become rigid, the spider is put carefully, with the fore-legs downwards, into a test-tube just large enough to admit it freely, without unduly compressing the legs, the tube having previously had a slip of white cardboard inserted into it exactly the width of the diameter of the tube, and about three-fourths of its length. This slip of card is to form a background to the spider, and to keep it steadily in one position. The tube is then filled perfectly full of clean spirit of wine, a parchment label containing the name of the spider is inserted in an inverted position, so as to coil round next to the glass, just above the spider, and the tube's mouth is pretty firmly stopped with a pledget of cotton-wool, after which it is placed, wool downwards, in a broad-mouthed, glass-stoppered bottle, large enough to contain from five to fifteen or so tubes when ranged within in a single row close to the glass, and kept in place by the whole vacant centre being firmly filled in with cotton-wool. The glass-stoppered bottle thus packed is then filled up nearly to the brim with spirit, making it impossible for that in the tubes to evaporate until the whole of that in the bottle has evaporated, which, if the glass stopper fits pretty well, will not be for several years. In each tube two or more specimens—male and female—may be placed one above the other, according to the length of the tube, and some specimens are placed so as to show the upper, and others to show the under side. When bottles so filled are arranged on narrow shelves not too far from the eye, they have a very neat appearance, and allow the spiders to be seen through the two glasses easily and perfectly. Of course, the bottle must be taken in hand to examine the contents at all closely, and must be turned round to bring those spiders on the opposite side into view. For critical purposes any tube may be taken out, and the spiders themselves removed from the tube without injury or difficulty, and as easily replaced. It is only necessary to use a pair of fine pliers with which to handle the specimens, and a pair of longer and larger ones, with oval cork or silk-padded points, with which to put in the tubes or remove them from the bottles. The label with the spider's name on it can be easily read through both the tube and bottle, if put in so as to coil closely round the inside of the former, which is, with very little practice, a simple matter to effect. The advantage of having the label *inside* is obvious; for it cannot then be rubbed off by external friction, and it can be removed and replaced at pleasure.

After many trials of different ways of managing test-tubes of spirit in which spiders have been placed, I can at last pronounce the above plan to be almost entirely satisfactory. When stopped with corks, and laid or kept upright in drawers, the spirit was quickly and constantly evaporating, requiring frequent refilling; besides which, the corks soon became rotten with the action of the spirit, and not only allowed that in the tube to evaporate, but also, often breaking in removal, caused considerable trouble, and sometimes damage to the specimens, in getting out the portion left in the tube. Another evil has also vanished by the use of wool pledgets instead of corks, and that is the occasionally serious cuts to the fingers from the sudden breakage of the tubes in corking. As the greater part of my own collection is intended for purely scientific purposes, I only take the trouble to set out here and there a specimen for the delectation of unscientific friends; for when set out, they occupy, of course, far more space in a tube than when put in just as they happen to come out from the effects of the chloroform, or other stupefying agent. A single tube will often thus contain up to twenty or more examples unset, but never more than one species in a tube, and often only one sex. In all cases the name of the species, or a number written on parchment, should be placed in each tube, as above described. Glass-stoppered bottles, containing inverted wool-stopped tubes, of unset spiders, may be filled quite full of the tubes, since there is no object in merely ranging them round next to the glass, as recommended when the spiders are set out in a natural posture; any tube must therefore, in this case, be taken out before the contents can be examined. The numbers and names, however, of the spiders contained in the bottle, are known at a glance, by being written at length on a paper and gummed upon one side of the bottle, and so, being turned outwards on the shelf, it is legible without any necessity of handling. The sizes of the test-tubes and outer bottles required will vary. I am now using (and finding more handy and convenient than any others of the latter) strong wide-mouthed phials (corked, but, of course, glass-stoppered ones would be preferable, though much more costly) of the following sizes:—½ oz., 1 oz., 2 oz., and 4 oz.: these are kept in stock by most chemists' bottle-dealers, and may be had at a very reasonable price. The tubes vary from an inch and a half long, and of the size of a large straw mote, to three inches long, and not too large to go into the mouths of the 2 and 4 oz. bottles, but large enough to contain the largest tropical spiders, except the comparatively few giants of the families Theraphosides, Thomisides, and Epeïrides: these may be put into the bottles without the intervention of any tube. When thus preserved, and arranged on narrow shelves, according to their systematic position, a collection of spiders is by no means an unsightly object, and its contents are almost as easily got at for reference and examination as the contents of most insect cabinets.

MICROSCOPY.

"Silicious Substances found in Portland Stone."—At a recent meeting of the Norwich Geological Society, Mr. F. Kitton read a paper on this subject, and exhibited some beautiful microscopic sections, with those of carboniferous Oolite, sandstone (India), silicified Oolitic limestone (Portland), and flint, showing sponge spicules, agate, &c. On examination of the specimen (Portland stone), presented to his notice, said to contain flint, Mr. Kitton remarked, that it did not contain true flint, not being nodular, nor exhibiting the conchoidal fracture when broken. It was doubly refractive, and its distinct crystalline character was shown, in this respect resembling the agates and porphyries. The microscope revealed no trace of organic remains, so common to true flints. The non-silicified portion of the stone was composed of the usual little calcareous bodies, which were formerly supposed to consist of the remains of organized bodies of a globular form, like the roe of fishes. Mr. Kitton further observed of the Oolites, of which he showed sections, that they formed no small part of the strata of this island, being supposed to form a zone of some 30 miles broad in England, divided into Upper, Middle, and Lower Oolite, and rich in fossil remains, these spherical concretions varying in size from a small pin's-head to a small pea: the latter is known under the name of Pisolite, differing from true Oolite only in the size of the globules. The silicified Oolite differed from flint found in chalk in its gradual silicification, whilst in the latter the segregation of silicic acid is complete. No portion of the silicified part of the specimen before him was equal to the flint in hardness, it not exceeding in that respect common granites. He offered the following explanation as seeming the most feasible in accounting for the silicification of the portion of the

Oolite. During the formation of this deposit some part of it was subject to the action of water holding a larger quantity of silica in solution than usual, and a portion of the Oolite absorbed it, this localized deposition of silica being produced by the presence of decomposing organic matter. As showing the agency of organic matter in solution in forming the calcareous globules, Mr. Kitton cited Dr. Rainey's experiments, in which a solution of gum in lime-water slowly precipitated the lime in small spheroidal nodules, showing a structure similar to that in a calcifying egg, or crab-shell, and in the semi-calcareous carapace of the shrimp.

Amphipleura Pellucida.—The latest measurement of the striæ of this well-known "test-object" is that of Professor Morley, of Hudson, Ohio, which he has recently communicated to the Memphis Microscopical Society. He estimates the markings at *ninety-two thousand* six hundred to the linear inch.

The Quekett Club. — This well-known and unpretentious Society is in reality doing the best microscopical work in London. Its "Journal" is always eagerly read, and its "soirées"—(the last of which was held at University College, Gower-street, on the 16th ult.) are always crowded by delighted sight-seers. The last number of the *Journal* contains several papers of great value, out of which we select Dr. Moore's, on the "Generative Processes of the Oyster, Mussel, and Cockle," as one dealing with a subject of much importance, that we should like to see even better cleared up than Dr. Moore has been able to do. Mr. White's paper on the "Salivary Glands of the Cockroach" is excellent, and we feel certain he has made out his case in reference to these disputed organs. Mr. P. Williams' article on "Cutting Sections of the Eyes of Insects" is a welcome contribution; as is also the paper by the hon. sec., Mr. J. E. Ingpen, on "Personal Equation." The "Journal" also contains another contribution from Mr. White, well written and very suggestive, on "The Aquarium as a Field of Microscopical Research."

Schmidt's Atlas.—We have received the third part of this work, containing plates 9, 10, 11, 12. Plate 9 contains 79 figures of species belonging to the genus Cymbella, many of which had never been figured previously. Plate 10 is devoted to Cocconema, of which there are 69 figures given. Plates 11 and 12 contain 105 figures of the panduriform Naviculæ.—*F. K.*

ZOOLOGY.

Provincial Natural History Societies.—Nothing could better indicate the wide-spread love of natural science, which forms such a feature in the social intellectuality of the present day, than the number of societies which are constantly being formed for the purpose of studying its various branches. Few towns of any importance are now without one or more natural history societies. Many of them show considerable intellectual activity by the publication of "Journals" and "Transactions," whilst the degree of original research also included is anything but small. Long may this spirit of inquiry continue! We have received (among many others) the reports of the Eastbourne Natural History Society, containing fully-printed papers, by H. Nichols, Esq., on "Ornithology and the Migration of Birds"; and an important paper by the Rev. H. E. Madock, on "Changes in the Coast Line, especially between Beachy Head and Hastings." From Manchester we have to acknowledge the annual report (full of excellent literary and field work) of the Scientific Students' Association. This is one of the largest, as well as of the most healthy and vigorous of our local societies, and has developed more than one good naturalist. The Manchester Geological Society has always held its ground as one of the best and oldest of similar provincial institutions, having a good library, and an excellent museum (now presented to the Owen's College). The last number of its Transactions contains a well-reported and important discussion on a paper by Mr. Kendall, F.G.S., on "Hematite Ores," as well as a paper on "Basalt," by Mr. G. C. Greenwell. The twenty-first annual report of the Natural History Society of Brighton contains an abstract of the year's proceedings, making up quite a little volume, and including among the contributors the names of Messrs. G. Scott, T. W. Wonfor, Sawyer, J. Clifton Ward, Pankhurst, and others. The Journal of Proceedings of the Wiltshire and Hampshire Scientific and Literary Society, just published, contains a capital introductory address by the Rev. C. Collier, and a paper by Dr. Joseph Stevens, on "Sarsens, Greywethers, or Druid Stones." The Rev. W. W. Spicer has an essay on "Two-winged Plagues." There are also papers on the "Chalk Formation," by Mr. C. Griffiths, and a "Gossip about Mites," also by Mr. Spicer. The Geologists' Association cannot be termed a *provincial* society, seeing it has its head quarters at University College. Still, it only lays claim to similar functions for London that the other societies do for their several centres, and is especially devoted to field geology, the members making excursions to various parts of England for days together. Most enjoyable outings these are, and well catered for by the secretaries. The "Proceedings" of this Association always contain readable papers, and in not a few instances very valuable ones. We are glad to see that the Watford Natural History Society has got into full swing, under the able presidency of John Evans, F.R.S., the president of the Geological Society, of London.

Several papers have already been read, chiefly on the Botany and Geology of Hertfordshire. Space does not permit us to further dwell on this subject, and we accordingly dismiss it with a word of congratulation to each society on its evidently healthy condition.

Rare Birds.—Under this heading your correspondent "E. V." asks whether Snow Buntings and Shore Larks are not rare so far south as Devon. As to the first, the Snow Bunting, I can assure him it is a regular and by no means uncommon winter visitant to both North and South Devon; it appears to arrive late in October or early in November, as I have found it on both Northern and Braunton Burrows, and up the river towards Barnstaple, about the 5th of November. At that time the Snow Bunting feeds eagerly on the seeds of the Sea Blite (*Suæda maritima*), both crop and stomach being crammed with the seeds; it then becomes very fat. It appears to depart again about the end of March, though sometimes it stays later; for some time ago I shot a pair on the Warren at Exmouth as late as the 10th of April: both these birds were then assuming summer plumage, most of the crownish margins of the feathers being worn off, the birds consequently appearing nearly black and white. There were several others about the warren at the same time, as far as I could see, all in the same plumage; the sailors about called them white linnets. The Shore Lark is by no means so common, although it has been obtained both in North and South Devon. One was recorded in the *Field and Zoologist* as having been obtained on Northam Burrows this winter. It has also been obtained at other places in Devon, as Torbay and Exmouth, on the Warren, at which latter place it is said to have nested; but this I should think very doubtful.—*Cecil Smith.*

Bee-keeping.—We are pleased to inform those of our readers who are interested in bees, that a "Manual of Bee-keeping," by John Hunter, hon. sec. of the British Bee-keepers' Association, is in the press, and will shortly be published by Hardwicke, 192, Piccadilly. The price (half a crown) will place it easily within the reach of the poorest; and we refer those interested in the matter to the large table of contents already published in our advertising columns, for an idea of the contents of the volume. The volume will be well illustrated.

Preserving Spiders.—In reply to "S. H.," in Science-Gossip for March, as to the *best mode for preserving spiders*, I find the following in an old work on "*collecting and preserving* insects":—"After the spider is killed by means of hot water, the entrails should be immediately extracted; then inflate them by means of a blow-pipe, and cleanse the inside *no more than is sufficient* to prevent mouldiness, for fear of injuring the colours; the abdomen may then be filled with fine sand." Another plan is mentioned. "Pierce the spider through the thorax with a pin, stick it in a deal box, and hold it near the fire for a few minutes, when the insect will be found dead; the contents of the abdomen dried, and the form and colours preserved. It will require a little practice to determine the exact time it should remain; for if left too long, the heat being too great, it will burst." Spiders may also be preserved in turpentine or spirit of wine.—*F. C. C.*

A Snake-eating Snake.—Regarding this singular reptile, recently placed in the Zoological Society's menagerie, Mr. Frank Buckland writes in *Land and Water*:—"It is rarely that we find among animals that Nature has ordained that a creature of a certain species should habitually eat and devour one of its own kind. The saying that 'Dog will not eat dog,' is proverbial amongst us. Nevertheless, there is now at the Zoological Gardens a recent arrival, a true 'Snake-eating snake,' most properly therefore, called *Ophiophagus elaps*. This is a most formidable fellow. In the first place he is very big—some seven feet odd inches in length, and about the thickness of a man's wrist in circumference. He is tremendously poisonous—as bad, if not worse, than the cobra, and is, moreover, a regular athlete among snakes. His head is very lizard-like and harmless-looking—not flat and triangular as is the head of the puff adder, the rattlesnake, or our own familiar viper. He has a most intelligent eye, and can move his head—keeping his neck steady—quickly, like a mongoose. He has, moreover, like the cobra, a hood, which he can expand when angry, and his body is ornamented with very pretty stripes. When I first saw this handsome, but treacherous and most poisonous of reptiles, I exclaimed, 'That's the fellow that tempted Eve!' This Indian gentleman does not condescend to such mean manœuvres: he simply glides after you with the swiftness of a hawk after a bird, and when he gets up to his enemy bites him and retires. He is therefore more to be feared than the lion, the elephant, or the boa constrictor. A man has some chance with any one of the former of these; with the *Ophiophagus* he has little or no chance, for one slight prick, quick as an arrow, of the poison-fang, and the life of the man ebbs out of a minute hole in the skin that would barely admit a needle's point. Dr. Fayrer, in his magnificent monograph of the *Thanatophidia*, or poisonous snakes of India, has given, from life-size drawings by Indian artists, two excellent portraits of this, the king of all the *Thanatophidia*. The learned Doctor gives the only correct account of this creature's habits, especially that of his eating other snakes. On his first arrival at Mr. Bartlett's, he ordered Holland (the keeper of the snake-house), to give *Ophiophagus* a live common English snake. Him *Ophiophagus* instantly seized and devoured head foremost. English snakes are not common at this time of year. Frogs, therefore, have been put into the cage with *Ophiophagus*, and it is curious to remark how the old frog sits at the water's edge, looking most suspiciously at his enemy, coiled up like an innocent babe in his blanket. How wonderful it is that the Creator has implanted in the poor brain of a common Hampstead Heath frog a fear of the poison-fangs of an Indian snake, of which he could never have heard, much less read; yet it is so."

BOTANY.

Evergreens and the Frost.—The extreme severity of the late frosts has given the opportunity of ascertaining the degree of frost the evergreens will bear in this climate, especially near the sea. In the nursery at Cliftonville may be seen the Gum-cistus, the Magnolia, and the *Cytisus triflorus*, which have not suffered at all; the latter indeed is just now (5th April) beginning to show flower-spikes: it is a hardy shrub, naturalized in and about Poole harbour; it was wrongly named *Genista pilosa* in a former number of Science-Gossip. In another nursery in Brighton may be seen a small shrub of the *Bupleurum fruticosum*, which has its leaves almost as perfect as before the frost: it is a native of the Pyrenees, and grows to five or six feet high; it is but little known as yet in our gardens. A number of young plants have lately been received at the Cliftonville Nursery. The *Medicago arborea*, described in a former number of Science-Gossip, was in flower in the same nursery during the early part of the frosts, the flowers only less expanded and the leaves were not at all affected; having been just cut back, it will be in full flower very shortly, and remain in flower very probably till next winter. The young plants of the *Atriplex halymus*, also noticed in a former number of Science-Gossip, have lost none of their leaves. The Rhododendron, where it has not been exposed to winds from the sea, has stood well, though, as a *flowering* plant, it does not succeed at Brighton after the first year. The common Laurel (*Cerasus Lauro-cerasus*) never thrives near the sea, while I am told the Euonymus (which, with some exceptions, has not been affected at Brighton) does not thrive inland, apparently requiring sea-air. The leaves of the Aucula appear in many situations to have suffered, but they will recover in the spring. Of the four plants of Eucalyptus noticed in the March number of Science-Gossip, one is dead, but the other three, there is every reason to expect, will recover. Young plants of *Garrya elliptica*, with its beautiful necklace-like, early sulphur-coloured catkins five or six inches long, in pots in the nursery of Mr. Smythe in the Dyke-road, have not suffered: it has been some time in flower. In the same nursery the pretty *Berberis Darwinii* and Escallonia are as perfect as in the autumn. The *Ruscus aculeatus* (Box-holly) in large masses is perfectly fresh in Adeleide-crescent, except where cut by wind from the sea, as appears to be the case indeed with many evergreens so exposed; even some of the Euonymi, particularly the silver-variegated species (which appear to be less hardy than the dark-green ones), and some others, have suffered from the sea-winds, but scarcely at all from the frost, except many of the very young plants which have not had time to harden their wood.—*J. B. W., Brighton.*

Insects and Flowers.—A capital and well-illustrated article on this subject appears in the last number of the *Popular Science Review*, from the pen of Mr. A. W. Bennett, F.L.S. The writer shows that the form of pollen-grain varies in wind-fertilized and insect-fertilized plants. In the former the pollen is always dry and dusty, the grains are not very large, they are usually nearly or quite spherical, and are never spiny or marked with conspicuous furrows or protuberances. In the pollen of insect-fertilized flowers, on the contrary, we find several distinct contrivances for the purpose of facilitating their attachment to the legs or bodies of insects. These are longitudinal furrows, varying in number to as many as nine; the existence on the outside of each grain of spines or other prominent projections; and the connecting pollen-grains together by means of viscid threads. Their shape also is different, the most common form being ellipsoidal. We strongly recommend our readers carefully to peruse this most interesting article.

On the Mounting of Mosses for the Microscope.—Sundry queries and notices occur in your volume for 1874 relative to this subject, in which the writers appear not to have been always successful. Having during the past winter devoted much time to mounting mosses, I thought some of your readers might be interested in the details of the process, by which I have been able to mount a considerable number of British mosses, including all the species I have been able to procure in this neighbourhood during the last few months. Where the size of the moss would allow, the entire plant has been used; in other cases, a portion of the foliage with the fruit. In all instances, the specimen has been, if possible, mounted with the capsule fully ripe. The material used has been Canada balsam, which had become almost solid with age. If the specimen of the moss was not fully matured, it was placed in a saucer, and watered from time to time, till the capsule opened. A small piece was broken from the tuft of the smaller mosses, and divided into individual plants, which were well washed in water, and then placed between the leaves of a book made of bibulous paper to dry. After this the specimen to be mounted was soaked in turpentine for half an hour, and then placed on writing-paper to drain. In the meantime the bottle containing the Canada balsam had been heated in an oven for half an hour, so as to render the medium liquid enough to be removed by means of a pointed cedar stick, and the estimated quantity placed in the centre of each of a number of glass slides. The balsam becomes immediately solid, and the specimen of the moss drained from the superfluous turpentine, is laid on the top, on which the circle of thin glass is carefully placed, and slightly pressed with the finger. The slide is then committed to the embrace of one of Smith's mounting instruments, and held over a fire to liquefy and diffuse the balsam. After this, the slide is removed, and placed for a few hours in an ordinary wire clip. The glass is finally cleaned with turpentine, and the black ring, after a time, put round by means of a turntable. The mosses already mounted have a very beautiful and characteristic appearance: a collection thus prepared will be valuable and interesting. Many of them polarize in a remarkable manner, especially as regards the nerves, tips, and borders of the leaves. Most of the specimens operated upon have been of this season's growth, but a few have been dried for many years. In the latter case, the plant is of course revived by immersion in water. Should this notice meet the eye of any collector of British mosses, who can send me specimens of rare or local species of Hepaticæ, I shall be most happy to return a portion, mounted for the microscope, or to exchange other slides for them. A small piece will be sufficient, if possible in fructification, either dried or recent, although the latter will be preferred.—*Henry Knight, Belfast.*

GEOLOGY.

Sand Dunes and Blowing Sand is the title of a paper in the last number of the *Popular Science Review* (which this quarter is unusually good). It is written by Mr. W. Topley, F.G.S., of the Geological Survey, and whilst dealing with an important geological question, is written in an exceedingly agreeable and even attractive style.

Structure of Columnar Basalt.—The interesting abstract of Mr. R. Mallet's paper on the Structure of Columnar Basalt, in the March number of Science-Gossip, has brought to my mind what I once noticed on the bank of one of the grand rivers of Burmah; and though it does not actually touch the question discussed by Mr. Mallet, yet it may be of some interest to your readers. Almost the whole of British Burmah,—certainly the whole of the province of Pegu, is one vast alluvial plain, built up by the accumulation of silt brought down from the higher lands by the rivers Irrawaddy and Sittang principally. The Salween, further to the eastward, having a basin of its own, has not contributed so largely to the building up of the alluvial deposit. The quantity of silt carried down in the water of these rivers, especially while in flood, though not equalling what I have seen in the water of the Nile, is very remarkable, and has often been to me very suggestive of the vast changes on the surface of the earth, which are being constantly and slowly wrought out before the eyes of those who have eyes to observe such things, by agencies ever at work around us. The Buddhist tradition of the origin of Pegu seems really to have been imagined by some one who watched what was going on around him. After hovering for ages over a waste of waters, the sacred *hansa* or goose, with its gander, noticed a tussock of grass appearing out of the water. Weary they settled upon it, but the foothold was so narrow that the goose had to perch upon the gander's back. They then flew away, nor did they revisit this spot till after the lapse of a whole *kalpa:* a fabulous age of untold thousands of years; when, lo! there was room for them to rest side by side; and so on from kalpa to kalpa, at each returning visit finding the space widened, till at last it was a province, with its cities and their inhabitants. That province is now the most fertile part of British Burmah, and I have often, while navigating the rivers that intersect it, remarked with interest their perpendicular sections, cut out by the rapid waters, of ten, twelve, fifteen, or perhaps more feet of purest alluvium; the particles of which the silt is composed being, as will be readily understood, the smallest imaginable. Landing one evening, in the course of a boat voyage down the Sittang, on a bank of silt of considerable depth, which had been left too recently by the river to be as yet clothed with vegetation, but which yet had been, owing to the fall of the water-level, baking in the tropical sunshine for perhaps some weeks, I found the surface quite hard and dry; but the action of the sun in evaporating the moisture, and thereby causing contraction, had caused a number of vertical or quasi-vertical fissures to open up, of very considerable depth, extending indeed, so far as I could ascertain, quite down to the bottom of the bed of *recent* silt. These fissures, running in various directions, reticulating the whole surface of the mud-bank, had cut it up into pretty equal and roughly hexagonal, or pentagonal figures, such as at once to suggest to my mind the section of columnal basalt. These columns of mud averaged rather less than a foot diameter; the fissures between them gaping to two, three, or even four inches wide. The tendency of these columns to split up in a direction perpendicular to their axis, so well described in Mr. Mallet's paper in the case of basalt, was occasionally, though less manifestly evident in the mud columns. According to Lyell ("Manual of Elementary Geology") the number of the angles of columnar basalt, though generally five to seven, may be as many as twelve. He also speaks (p. 487 of the Manual) of the transverse division as being generally, but not universally present.—*I. G. Halliday.*

NOTES AND QUERIES.

Frost Phenomena.—While the article in the January number of Science-Gossip in regard to frost phenomena is interesting, it fails to give a correct idea in regard to it. It may be known to some of your readers that there have been two mountain stations in New Hampshire, where meteorological observations have been taken. One of the stations, Mount Washington, the height of which is 6,291 feet, is still occupied; the other, Mount Moosilauk, 4,811 feet in height, was occupied by me in the winter of 1869-70. It was here that this frost phenomenon was first studied in this country. During almost the entire winter of 1870-71, I had an opportunity of seeing it on Mount Washington. This form of precipitation has been called "frost-work," "frost-feathers," and "snow-ice." It is difficult to convey in words any idea of its wonderful form and beauty. It is very rarely formed on our mountains except when the wind is at some point between north and west, and only when there are clouds on the mountain. If it was of the nature of hoar frost, it would form when it is clear. It begins with mere points on everything the wind reaches,—on the rocks, on the railway, and on every part of the building, even on the glass. On the south side of buildings and high rocks it is very slight, as the wind reaches here only in eddying gusts. When the surface is rough, the points, as they begin, are an inch or more apart; when smooth, it almost entirely covers the surface at the very beginning, but soon only a few points elongate, so that on whatever surface it begins to form, it has soon the same general appearance, presenting everywhere the same beautiful feathery-like forms. In going up Mount Washington, we do not see the frost-work until we get above the present limit of the trees. It is nearly a mile above before it is seen in its characteristic forms, and it is only about the summit that it presents its most attractive features. On all our mountains north of latitude 43° 50′ that are more than 3,500 feet in height, it can be seen extending down to a certain line, and this line extends along the whole mountain-range at the same elevation. The rapidity with which it forms, and the great length of the horizontal masses, are truly wonderful. On the telegraph-poles, near the very summit of the mountain, the horizontal masses are often five or six feet in length, and from near the top of a tall chimney they are sometimes ten feet. On the southern exposures, instead of the frost-work, especially on the telegraph-poles, there are only masses of pure ice, which have always a peculiar line of greenish blue: there is a striking contrast between this and the pure white of the frost-work on the side opposite. When the thermometer ranges from 25° to 30° and the wind is southward, ice forms to the thickness of a foot or more on the telegraph-poles near the summit. These icy masses are formed evidently by the condensation of the vapour of the atmosphere. The frost-work or snow-ice is also formed by the condensation of vapour; but besides the vapour, the air must be filled with very minute spiculæ of ice. As the vapour condenses, these are caught, and thus the horizontal feathery masses are formed. If it was of the nature of hoar frost, it would form when the sky is clear; but it forms only when there are clouds on the mountains.—*J. H. Huntington, Hanover, N. H.*

The Claw in the Lion's Tail.—In Bonomi's "Nineveh and its Palaces" may be found the following curious illustration of the accuracy of the observation of the Ninevite Landseers nearly 3,000 years ago. In the British Museum, one of the Nineveh sculptures represents a lion-hunt, and, curiously enough, in the tail of one of the lions crushed under the horses' feet, occurs the claw in the tail. Bonomi says: "The existence of a claw in the tuft at the end of a lion's tail was disputed for ages, but here, in these ancient sculptures, is an exaggerated representation of it in support of this curious fact in natural history. The peculiarity was first recorded by Didymus of Alexandria (an early commentator of the Iliad), who flourished forty years before the Christian era. Whatever may have been the supposed use or intention of this claw, its existence has been placed beyond dispute by Mr. Bennett, who, at one of the meetings of the Zoological Society of London, in 1832, showed a specimen of it, which was taken from a living animal in the society's menagerie." Ancient writers think that the lion lashes his sides with his tail to stimulate himself to rage, and Didymus, who mentions the claw, thinks it was provided for the better purpose of doing so; or is it, as possibly Mr. G. St. Clair, in his "Darwinism and Design," would have added, another illustration of "imperfect adaptation," in which the claw has been inherited from an ancestor to whom it was of greater use, and in whom it was more fully developed, but the reason for its continuance when no longer useful is, "that laws of inheritance are not easily altered." If I might venture to suggest a reason for its existence, it would be that nature has kindly provided the lion with an appendage to its tail more effectually to scratch "the little fleas upon their backs that bite 'em," or perhaps to tickle a fly which was rather too persistently and impertinently sucking the blood of the king of beasts.—*Wm. Budden, Ipswich.*

Sudden Disappearance of Plants.—In 1872 a bank in a lane near Rugby contained hundreds of plants of the Little Crucifer (*Teesdalia nudicaulis*). In 1873 there was not one plant to be seen. In 1874 again they began to reappear, and six or seven roots and flowers were observed. Is it likely it was choked by the grass? Another, though a less marked instance of disappearance I have observed in *Carduus Marianus.* This thistle was observed in 1870, but after that did not make its appearance at all till September, 1874, when the leaves began to show themselves, and in October a bud appeared. What is the probable cause of this? It cannot be due in either case to the plants having been overlooked, for the habitats were searched thoroughly by more than one observer.—*N. H. S.*

A Carnivorous Hedgehog.—It may interest "F. C. S." and others to know that my experience of hedgehogs has convinced me that they are carnivorous, if not, indeed, omnivorous animals. Amongst the many hedgehogs I kept between the years 1866 and 1872, I remember trying on one an experiment, it having occurred to me that hedgehogs preferred flesh to other food. Accordingly I placed one morning before a tame hedgehog, a saucer full of bread and milk, and also one of *raw* beef; the hog at once smelt at the bread and milk, then at the saucer containing the beef, which he at once, with a squeak of approval, devoured, I may say ravenously. I have found that all the hedgehogs I have kept would always leave anything for raw meat; not so with cooked, which they seemed not to care for. A friend once told me he gave his pet hedgehog dead field-mice every day, which were readily devoured by the hog; indeed he went so far as to say, that during the summer the hedgehog would capture mice of his own accord. It is stated by some that hedgehogs have a great liking for worms (see Wood's "Anecdotes of Animal Life," p. 257). Goldsmith, in his "Animated Nature" (vol. ii. p. 338), mentions a hedgehog's attempts to procure meat. With all these proofs before us then, and no doubt many others not yet come to light, I think we may conclude that the hedgehog's appetite certainly is a carnivorous one, if, indeed, we don't say omnivorous.—*Charles Williams, Redland.*

Cytisus Scoparius.—This plant, which until the last thirty years was classed under the genus *Spartium*, grows in a dry sandy soil, and attains the height of about 7 ft. The flowers are large and yellow, and the numerous and graceful branches, in summer loaded with blossoms, look extremely beautiful. The seed-vessel is a broad black pod fringed with hairs, and contains about twenty seeds, which when eaten act as an emetic. In parts of England the plant has been used for thatching cottages and haystacks. Curtis, in his "Flora Londinensis" states that he has been told on good authority that in parts of Scotland where coals are scarce, whole fields are sown with its seeds to form fuel. On the root of this plant the Great Broomrape (*Orobanche major*) grows, and attains a height of 16 or 18 in.; its flowers are generally of a purple hue, but are variable in colour, and the seeds are very small and numerous; this plant does not confine itself to the roots of *Cytisus scoparius*. Curtis gives a list of shrubs that it grows on, which are all, with the exception of one, leguminous. Another kind of broom, besides the *C. scoparius*, which grows in this country, is called the Spanish or Rush Broom (*Spartium junceum*). According to Burnett, in his "Outlines of Botany," it received its name from its rush-like branches having been used in the manufacture of cordage. The same author also states that its fibres are twisted and used as thread in Languedoc. Its yellow flowers are very attractive to bees.—*E. H. G.*

The Upas Tree.—Those who have visited the galleries of the South Kensington Museum will have noticed the picture on this subject. *Apropos* I would ask if there be any foundation for the certainly remarkable stories respecting this tree. It is said that condemned malefactors are deputed to collect the poison, and accept the mission only as a last chance for life. As the supply of capital offenders must necessarily be limited, it would be interesting to know how the requisite stock is kept up.

White Varieties, &c.—Having often found *Erica tetralix* perfectly white, I thought "W.," of Oxford, might be glad to know the localities for it. Near Teignmouth, in Devon, there are several large downs, and on all of these (a few years since) I have often found the *E. tetralix* growing with *E. cinerea* in tolerable abundance, and perfectly white specimens every here and there, especially on one of the downs called Millbourne, not far from Newton Abbot, the white variety abounded. I have also, near Kynance Cove, the Lizard, Cornwall, found specimens of the *E. vagans* quite white. A curious fact occurred in a copse at Sandling Park, near Hythe, in Kent, in relation to the sudden appearance of *Digitalis purpurea*. A part of the trees had been cut down early in the year 1872; in July the site was covered with a large bed of the Digitalis, the greater part of which were of a beautiful cream-colour. The next summer these had, all but two specimens, disappeared, and last year none of the cream colour were to be seen, and only a very few of the ordinary coloured plants were left. In the meantime of course the trees had been growing, and I fancy the Digitalis is a plant that requires both air and sunshine to bring it to perfection. In Devon, especially near Lustleigh Cleave, I have often seen pure white flowers standing out conspicuously from the midst of hundreds of their darker brethren. I have also very often in Devon found the *Geranium molle* quite white; and here, in the neighbourhood of Folkestone, *G. Robertianum*, with pure white flowers often occurs.—*J. Fitz Gerald, Folkestone.*

New Zealand Forests.—I scarcely think your correspondents have understood all the elements connected with the transplanting of New Zealand native trees. In my thirty years' experience the difficulty was not the soil, but the atmosphere. The habitat of these plants is a still and moist atmosphere, without frost; and give them that, they will grow almost anywhere. I tried repeatedly to grow the beautiful Rimer (*Dacrydium cupressimum*) as a detached tree, but it always grew sickly until it was planted amongst a thick mass of other shrubs and kept from the wind and sun. Three or four species do well on the edge of the forest, having shelter and moisture on one side; but two of these (the Karaka, *Corynocarpus*, and the Parrot's-beak, *Clianthus puniceus*), were introduced by the natives when they emigrated from a warmer climate.—*Henry Weekes.*

Anodonta.—Can any of your readers tell me the largest size which shells of this genus attain in Britain? I have one (*A. cygnea*) from a pond at Southampton, which measures 7½ in. in width.—*A. W. Langdon, Hastings.*

Cure for Toothache (?)—Dr. Phipson's work on "The Utilization of Minute Life" contains the following paragraph with reference to those familiar insects, Ladybirds (*Coccinella*). "They secrete from their legs when captured an acrid yellow fluid, having a disagreeable odour. It is, doubtless, to this fluid that they owe their property of curing the most violent toothache when they are placed alive in the hollow part of the tooth." I should be glad to know whether any correspondent has observed the emission of this secretion, and experienced its strange medicinal property. If this is so certain a cure for "the most violent toothache," could not this valuable fluid be artificially extracted from insects cultivated for the purpose, and would it not become a rare remedy for such a troublesome malady?—*G. Dannatt.*

The Death's-head.—May not the native species of *Atropa* and *Solanum* have served for the food-plant of this species, prior to the introduction of the potato? It seems most probable that the insect was imported with the root, rather than that it is a purely native insect. I have often intended to ask, and perhaps I may be allowed to do so now, does this insect, on its emergence from the pupa in October, pass the winter in the moth or in the egg state; also if the life of the species extends over three years, *i.e.*, one winter in the pupa, and the next in moth or egg stage? The economy of the species in question seems very inadequately dealt with by our entomological authors.

Green Food for Caged Birds.—My experience leads me to think that it is quite right to give all song-birds kept in confinement some green food at every season of the year. My birds (a bullfinch and a canary) have had watercresses, lettuce, and mustard and cress, during the entire winter. I give them as spring comes on, chickweed, groundsel, and various kinds of salad leaves. When green peas and fruit are in season, my feathered pets get a share of each, and very fond they both are of tender young peas and ripe strawberries, but I never at any time give them much: seeds form their chief article of food, green diet is their dessert.—*Helen E. Watney.*

Canterbury Discoveries.—In his interesting paper on "Our British Fritillaries," in last month's Science-Gossip, Mr. Clifford has admitted *Argynnis Niobe* into the list, alluding to its discovery last year in Kent. I have a specimen of this butterfly, obtained from Canterbury, which I have now not the slightest hesitation in pronouncing an old and re-set Continental insect. I should be sorry to say what it cost me to secure it, whilst the Niobe mania was raging. I am supported in my opinion by several well-known entomologists in considering the *Niobe* affair a fabrication from beginning to end. The glowing account of its discovery may be found in a leading entomological magazine, and an illustration of it was promised therein, but from sundry revelations that transpired, the matter was allowed to drop out of sight. *Cucthocampa pityocampa*, the Processionary moth, the larvæ of which it was stated were found in such abundance, was another famous Canterbury discovery, and just as great an imposture. Specimens of *Lathonia, Daplidice, Leucophæa, Erythrocephala*, all "taken near Canterbury," on being submitted by me to one of our highest authorities on insects, were emphatically declared to be "re-set Continental specimens."—*J. Anderson, jun.*

Expansion of Heated Air.—I have a small circular terra-cotta fern-case, about 6 in. diameter, covered with a glass 6 in. high, in which I was growing mustard-seed. I heard the cracking of glass, and looking round the room to see from whence the sound proceeded, I found the fern-case glass divided in two by a crack, and it fell in half when I touched it. Could this have happened from the expansion of the air? The glass was not fixed, I own, but rested tightly on the edge of the stand.—*R. H. Nisbett Browne.*

Cleavage of Slate.—It seems, by a notice in the *Saturday Review*, 6th March, 1875, of a work by Mr. Kinhahan, the law of rock-cleavage is not yet understood. Mr. Kinhahan does not know why the excessive force exhibited by cleavage should exist, unless "an obscure tendency to cleavage previously existed in the rocks." Will you allow me to place before your readers the outline of the law which produces cleavage; there is nothing obscure in the action, it is always before our eyes. I have before me a dusty road—a heavy shower washes dust into the pools as suspended mud. There is a current through one pool, the other is still; when the water subsides, and the mud dries, one mass cracks, the other exfoliates. There are two results on the same material, deposited by the same force. The atoms in the still pool subside vertically, under a vertical water-pressure. The law of gravitation sends the heaviest point downwards; the result of this law forms the mass into a fibrous condition; as it dries, it contracts: it cannot shrink across the grain, so it cracks with the grain vertically into numerous fissures. Wherever the adhesive condition of rocks is strong enough it splits the pebbles in the line of fissure, on the principle that a part is not so strong as a whole. In the other pool the atoms subsided horizontally, under the influence of the current; they formed the grain of the mass on the line of the current; hence when this mass dried and contracted, it could not cleave as the other had done, but satisfied the contracting force by the exfoliation of its successive surfaces into continuous sheets. This law holds good all through nature. The flagstone, the slate, wood, meat, all have their grains, and their lines of fissure from their deposit.—*H. P. Malet, Florence.*

Undue Blossoming of Horse-Chestnuts.—I noticed in Science-Gossip for March, 1875, that your correspondent J. G. Halliday found a horse-chestnut tree in blossom when in Paris last September. I can state that the same thing occurred in our city; I saw three of the horse-chestnut trees, in about the middle of September, 1874, with new leaves and in full blossom. But I found the flowers much smaller than in their regular season, and could find no ripe pollen in them: the leaves of nearly all our horse-chestnuts began to turn yellow in about the first or second week of August, and fell off early in September. I examined several of the leaves under the microscope and found the underside of the leaf spun over with a kind of a tuft or web of a spider, but could find no living insects on it. But the leaves were all dry. If it should occur again this summer, I will try to find the cause of it. I did not hear whether the same species was affected the same way in other cities and towns or not.—*H. W. Hollenbush, Reading, Pennsylvania.*

Sparrow *v.* Mouse.—In the number for March (page 71) B. W. Woodward has a query on this subject. It is not unusual for sparrows to attack mice. I caught a mouse in a live trap some time ago, and not liking to hand it over to the teasing of the cat, I let it go free on the grass-plat of my garden, and was much amused by seeing several sparrows pounce upon it and buffet it, screaming all the time in fury. The mouse ran under a plant; the sparrows waited for it, and had a second chase, when it escaped into some bushes, where its persecutors could not follow it. My idea on the subject was that the mouse occasionally treated himself with a new-laid egg, of which the sparrows were aware, and expressed their indignation accordingly.—*B. G. Cubitt.*

Microscopical Query.—In reply to the query of "H. C. Mo." in the last number of Science-Gossip, may I suggest that the phenomenon he witnessed was probably the effect of evaporation, or that it was that molecular movement which is common to all bodies suspended in fluid, which are in a state of sufficiently fine subdivision (see Carpenter "On the Microscope," p. 184, s. 106)—or possibly both combined.—*A. H.*

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.

J. Cairns.—Your plants are the White Beam-tree (*Pyrus aria*), and the Rock-rose (*Helianthemum vulgare*).

J. S. Harrison, and many others.—Our warmest thanks are due for the numerous expressions of sympathy we have lately received regarding the death of our late publisher. It s very gratifying to us to find that so many readers of this journal held its founder in such deservedly high estimation.

F. C.—Your specimen is a piece of highly crystallized mica-schist, such as you may obtain in any abundance on the shores of Loch Lomond.

Wood Lice.—Perhaps some of our correspondents can inform H. J. B. how to clear his fernery of these pests.

F. G.—The name of the tree you mention is correctly spelt.

W. B., Saddleworth.—The Pile-wort (*Ranunculus ficaria*) is also called Lesser Celandine.

A. J. Wright.—Wood's "Insects at Home," or "Episodes of Insect Life." will give you the information you seek respecting aquatic species.

Erratum.—In Mr. Clifford's paper on "Fritillaries," published last month, a transposition was made between Nos. 44 and 45, which will have been evident to our entomological readers. Each figure has the name of the other.

Rev. S. A. B.—The fish were decomposed when they reached us. They are the Smooth-tailed Stickleback (*Gasterosteus leiurus*).

W. F. W., Chard.—The plant sent is the Green Hellebore (*Helleborus viridis*).

G. L. H.—The fungus enclosed is *Peziza aurantia*.

C. H. R.—Your letter, asking the name of "the enclosed plant" did not contain any specimen.

G. H. Payne.—Your specimen is the Oxlip (*Primula latior*), not uncommon in meadows.

A. C. R. L. M.—Your plant appears to be the Stinking Iris, or "Gladdon" (*Iris fœtidissima*).

H. Emerson.—Canon Kingsley's "At Last" dwells at length on the geology and natural history of the West Indian islands, especially of Trinidad. See also Grisebach's "Flora of the West Indies;" Gosse's "Naturalist in Jamaica;" and the recently published work entitled "The Pearl of the Antilles."

H. W. T. (Rugby).—Yours ferns are:—

1. *Polystichum angulare.*
2. *Polystichum aculeatum.*
3. Do. do. } seedlings.
4. Do. do. } seedlings.
5. *Polystichum angulare.*
6. A seedling form of *Pteris aquilina*, the common Brake of our hills and commons.

P. angulare is a very variable species, as changeable almost as a chameleon.

EXCHANGES.

Wanted, specimens of Fruits, Seed, and other Vegetable Products used in the arts, or otherwise interesting, especially Lace-bark and Rice-paper.—W. Piper, F. Sutton & Co., Bank Plain, Norwich.

For Cuticle of Tulip send a stamped directed envelope to W. H. Gomm, Somerton, Taunton.

Larvæ of Scarlet Tiger-moth, for British Lepidoptera (*Imago*).—W. Lewis, Walmer-court, Walmer, Kent.

Wanted to purchase the following works:—"British Desmidieæ," Ralfs; "British Fresh-water Algæ," Hassall; "British Diatomaceæ," Smith.—R. Bythele, 9, Hesketh-crescent, Torquay.

Land and Fresh-water Shells, Diamond and Burying Beetles, and other Lepidoptera, for Eggs of the Raven, Merlin Hawk, and Kite.—C. Dixon, 60, Albert-road, Heeley, Sheffield.

Wanted, Silkworms' Eggs, in exchange for "The Parlour Telegraph," comprising Single-needle Instrument, Battery, Connecting Wires, and Instructions.—Joseph Gaunt, 23, Martin-street, Woodland-terrace, Halifax.

Parasites (unmounted), for good Mounted Objects. List exchanged.—F. J. Kingsbury, 7, Loughborough-Park-road, Brixton, S.W.

D. Fleming, 1, Lorne-terrace, Strathbungo, Glasgow, will be glad to exchange Kenny Meadow's edition of Shakspeare for a good working Microscope or a standard Natural History. There are twenty-five 2s. parts unbound.

Wanted, Parasite of Bat (*Nycteridia*), also Ixodes from Boa or Snakes. Good exchange given.—H. E. Freeman, 48, Woodstock-road, Finsbury-park, N.

Marine Polyzoa, British and Foreign, many species, in exchange for others (unmounted).—Send list to George D. Brown, Henley Villa, Ealing, W.

For exchange, Normandy's "Commercial Analysis," quite new, one leaf *only* gone. Geological slides preferred.—Apply to Wm. Sargant, jun., Caverswall, Stoke-on-Trent.

For anything useful in Natural History—Lizards (living), also Beetles, Larvæ, Ova, Insects, &c.—from fresh or *salt* water; also Diatoms, Foraminifera, Zoophytes, Mollusca, Echini, Algæ (prepared for mounting in balsam, &c.), Mosses, and various other Botanical and Marine Material, *Fucus Mackaii* in fructification, &c. &c.—Terence McGann, Burrin, Ireland.

For well-mounted Transparent Injected Human Kidney, send other first-class Injection A few others to exchange.—W. Tylar, 165, Well-street, Birmingham.

Plants from the South of France, for rare Mosses, Lichens, or Alpine or Mountain Plants; not others.—Apply to T. H., Highfield, Sydenham Hill, S.E.

For Diatomaceous Earth from Virginia, U.S.A., and Foraminifera from Mediterranean and other localities, send stamped directed envelope and good mounted or unmounted Object, to R. S. Fletcher, West Stockwith, near Gainsborough.

Wanted, Plants of *Valisneria*, and other Plants suitable for Aquarium.—S. A. Brenan, Pomeroy, co. Tyrone.

Viola *Cartisii*, *Equisetum arenarium*, &c., for rare Alpine or Foreign Plants.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

Larvæ of *Hypercompa dominula* and *Porthesia chrysorrhœa*, in exchange for British Marine and Land and Fresh-water Shells.—Address, Sidney Smith, Castle-street, Walmer, Kent.

Puccinia *Smyrnii* for other good Mico-fungi.—J. H. A. Jenner, Lewes.

For Seeds of *Collomia* (spiral fibres), send stamped directed envelope to F. Coles, 248, King's-road, Chelsea.

Wanted, two or three river Crayfish for preserving; also a few *Dytiscus marginalis* and *Hydrous piceus*. In exchange, British Lepidoptera or Fossils from the Barton clay.—E. B. Kemp Welch, Bournemonth.

Good Slides of Stellate Hairs from stem of *Aralia papyrifera*, for mounted objects. List exchanged.—30, Silent-street, Ipswich.

T. J. would be glad to exchange Pleistocene Sand, rich in Foraminifera from March, for Silurian Trilobites.—192, Piccadilly.

BOOKS, &c. RECEIVED.

"Worksop," "The Dukery," and "Sherwood Forest:" Works of Robert White.

"Popular Science Review." April.

"Monthly Microscopical Journal." April.

"The Colonies."

"Land and Water."

"Les Mondes."

"Ben Brierley's Journal."

"Journal of Applied Science."

"American Naturalist."

"Canadian Entomologist."

Communications Received up to 17th ult. from:—M. B.—H. E. W.—H. P. M.—H. W. H.—W. L.—C. D.—J. S. H.—G. P.—W. T. B.—W. T.—C. M. C.—F. B.—C. W.—J. H.—J. A.—R. H. N. B.—R. B.—E. H. G.—L. K. T.—A. B.—M. H.—L. G. H.—S. W.—J. F.—F. B. D.—H. W. T.—F. G.—W. B.—A. J. W.—T. B. W.—O. P. C.—J. H. W.—A. H.—J. W. D. H.—S. A. B.—W. F. W.—W. G. P.—J. H. A. J.—F. C.—C. P. H.—W. H. G.—E. B. K. W.—J. C.—A. H.—J. F.—A. F. M.—B. G. C.—F. C.—H. J. B.—A. B., jun.—E. A. G.—W. J. S. S.—W. W.—F. S.—A. D.—T. H.—H. M. C. A.—G. B.—J. T. T. R.—F. C. C.—C. S.—G. A. L.—L. T.—J. B.—W. L.—A. J. R. S.—H. M. J. U.—H. K.—J. H. A.—W. S., jun.—G. D. B.—A. H.—A. P. H.—T. McG.—J. G.—F. J. K.—H. E. F.—E. H.—D. F.—T. E.—T. E. J.—W. H. B.—M. K.—J. De C.—T. G. B.—W. H. P.—T. B. B.—Dr. D.—H. E.—H. G. G.—J. W. W.—C. H. R.—G. H. P.—S. J.—A. C. R. L. M.—F. & T. R.—K. D., &c., &c.

ON THE GENUS ARACHNOIDISCUS.

By FRED. KITTON, Norwich.

THE following remarks on the abovenamed genus may assist the young diatomist to discriminate the few species contained in it.

It might naturally be supposed that a genus containing not more than four species — these by no means uncommon, and not requiring any great amplification,—could not offer much difficulty in their identification; but such is not the fact, as I frequently receive specimens wrongly named.

This beautiful genus was originally detected in a perfect state by Mr. Henry Deane, and brought before the Microscopical Society in 1847.

Mr. Shadbolt read a paper before the same society on the "Structure of the Siliceous Lorica of the Genus Arachnoidiscus," afterwards published in the third volume of the "Transactions of the Microscopical Society," 1849 (this was previous to the amalgamation with the *Quarterly Microscopical Journal*), and illustrated with some very excellent figures from drawings made by Mr. Legg.

Single valves and fragments had previously been detected in Ichaboe guano by Mr. Deane, Topping, and others. This deposit seems to have been discovered in 1843, and exhausted in 1844. This form was therefore known to some microscopical observers thirty years ago.

Ehrenberg, in 1848, describes* one of the species under the name *Hemiptychus*, but as there was a Hemiptycha, a genus of Hemipterous insects, the name was withdrawn.

As Mr. Shadbolt's description of the structure, &c., is very interesting, I shall give some portions of it in his own words.

"The following observations apply to the shells alone, and not to the animals inhabiting them (if animals they be); for although the specimens submitted to examination were recent, they were not in my possession until they had been dead some months." (The supposed animal nature of this form may probably excite a smile in the present generation of diatomists, but thirty years ago diatoms were generally supposed to be animalcules, and it was gravely stated that they possessed mouths, were ciliated and many-stomached (hence called *Polygastrica*). That their animality was but little doubted is evident from the following passage. "In viewing these disks as transparent objects mounted in balsam, it is by no means easy to determine whether they have or have not a central aperture; but on viewing them as opaque objects it becomes indisputably evident that a central opening is present. When *in situ* these openings are partially covered internally by a delicate cup-like process, so as to form a species of valve. I consider it highly probable that at these openings nutriment is taken in, and from the peculiar radiating arrangement of the siliceous parts immediately around them, it seems not improbable that the animal may be provided with organs somewhat resembling in arrangement the tentacula of madrepores. This is supposing the objects to be of an animal nature, of which I confess I think there is very little doubt." I need scarcely remark that no central pore exists, and that tentacula are never protruded.

The author then proceeds to describe "two annular valves lying between the two discoid ones. These valves consist of a siliceous ring, within which (extending a slight distance towards the centre) is

* In the "Monats-Berichten der Berliner Academie."

an annular membrane, and when *in situ*, the valves are placed so that the membranes are in contact; and thus the space included between the two discoid valves is partially divided into two (not three) chambers. The membrane is so thin that when mounted in balsam it is not visible. I have, however, been able to detect it upon one or two occasions." This annular valve is of course the cingulum or connecting-zone, and no membrane is present.

The description of the valves is more accurate. "The two parts of the disks consist of, firstly, a very thin membrane, somewhat flexible and elastic, and capable of resisting the action of boiling nitric acid, and on this membrane are the characteristic spider's-web-like markings which have given rise to the name of the genus; secondly each disk is composed of a siliceous framework admirably adapted to support and strengthen the outer membrane, and bears a very close resemblance to a circular Gothic window."

The author is mistaken in supposing that the thin valve is uppermost; the upper valve is stout, and the so-called siliceous framework, so far as I can make out, is an integral portion of it. The thin valve is below, and is probably an early state of a newly-formed valve, and which will, after self-division has taken place, form the opposite valve of the frustule.

The species of Arachnoidiscus hitherto described are the following:—*A. Ehrenbergii*, *A. ornatus*, *A. Grevilleanus*, *A. Hardmanianus*, *A. Indicus*=*A. Ehrenbergii*. The form figured and described by Mr. Shadbolt is the second in the list, and is apparently more widely distributed than *A. Ehrenbergii*. It is distinguished from the latter by the transverse costæ between the radiating lines; those near the margin are irregularly branched, resembling the venation of the leaves of a dicotyledonous plant; the spaces between the costæ are delicately punctate, the puncta becoming larger as they approach the centre.=*Hemiptychus ornatus* (Ehrenberg), *Arachnoidiscus Japonicus* (Shadbolt), *A. Nicobaricus* (Ehrenberg), *A. ornatus* (C. Janisch, in "Zur Charakteristik des Guano's von verschiedenen Fundorten," p. 12, Taf. 1, fig. 3. South Africa, Nicobar Islands, West Coast of S. America.

Arachnoidiscus Ehrenbergii may be easily recognized by the absence of the transverse costæ, the large irregularly-shaped granules between the radiating lines. These granules, when examined with oblique light, appear to consist of closely-packed beads. *A. Indicus*, Ehrenberg, "Microgeologie," Puget's Sound, Monterey Stone, Vancouver's Island.

The form figured in the Synopsis is probably the above, but there can be little doubt that it never lived in any British locality; moreover, the form figured was not from the photograph of De Brébisson's. Tuffen West told me that the drawing was made from an actual specimen. This fact accounts for the non-agreement of Smith's generic characters with the figure.*

Bailey in a letter to Dr. Arnott (Walker Arnott on Arachnoidiscus, *Quart. Journ. Mic. Soc.*, vol. iv. p. 161), says, "I see that Smith in his Brit. Diat. gives me as the founder of the genus. This is not correct; but the species is mine, and is very different from *A. Japonicus, with which Smith confounds it.*"

Arachnoidiscus Grevilleanus is a rare species occurring in the Barbadoes deposit: it possesses the radiating costæ characteristic of the genus, which reach nearly to the centre of the disk; alternating with these are shorter rays, above one-third of the length of the principal rays, but the central smooth space surrounded by a circle of elongated cellules is wanting, the centre being occupied by a little star composed of five or six minute elongated cellules. The margin of the valve has several rows of small cellules, which become larger midway between the centre and margin, and again becoming smaller and scattered as they approach the centre. (Greville, in *Trans. Royal Mic. Soc.*, vol. xiii. p. 47, pl. v. fig. 7.)

The last species of this genus was placed by Dr. Greville in his genus *Stictodiscus*, but its affinities, judging from his figure and description, are with the present genus. As I have never seen this species, I can only give Greville's specific characters.

"*Stictodiscus Hardmanianus.*—Large; radiating compartments numerous, reaching nearly to the centre, with five to six rows of minute puncta at the base (margin of valve), followed by a single row of pseudo-pores; centre occupied by two circles of granules, and a minute cluster at the umbilicus; diameter ·0050″. Monterey deposit. Mr. Hardman."

It will be seen from the above description that this species only differs from the type forms in the absence of the circle of elongated cellules, and which are represented by a circle of large moniliform granules.

The probability of the specimen of Arachnoidiscus being a British form is to my mind very doubtful, although two cases have been published of its occurrence; viz., one frustule by De Brébisson, as cited in the Synopsis, and one by Captain Hutton, F. G. S. (*Quart. Journ. Mic. Science*, vol. v. n.s., p. 132). If this form had really lived on our coasts, more than three specimens would have been discovered in thirty years. Captain Hutton's specimens were supposed to have been in a gathering made from a small brackish waterpool at Malahide, but were probably attached to the test-tube in which the gathering had been boiled. The writer remarks that he had not cleaned any material containing

* Frustules adherent, disciform; valves plane or slightly convex, cellular, marked with concentric and radiating lines; pseudo-nodule central, conspicuous.

Arachnoidiscus for ten months, and the tube had been in constant service; still it is more probable that these specimens had become detached from the tube, than that they had lived in the pool.

THE AMERICAN WILD CAT.

(*Lynx rufus*, Raf.)

FOR weeks I had been watching the daily movements of a family of ground squirrels (*Tamias striatus*), that racing to and fro along my garden fence, and scampering, when disturbed, to their burrows in the adjoining hill-side, had afforded me much amusement. Persistently I had followed them up, and once, with shovel and trowel, had brought light to their well-concealed nest, in spite of the intricate windings of the passage, three yards long, that led to it. Their life history was well nigh unravelled, and I was at last brought to envy them, for the double reason that they *seemed* never to want for anything, and had no enemies. Surely they were to be envied; but to-day I learned my my error in this latter respect (it is never safe to jump at conclusions in zoological matters), and while lying, half-concealed, in the long grass, fringing a narrow belt of woodland, saw the little squirrels (they are not true squirrels) in great distress, and met with an undoubted enemy of my envied friends.

Half crouching on the trunk of a lately hewn chestnut-tree, was a fierce wild cat, glaring upon the frightened squirrels as they rushed to their nests, while he held in his murderous jaws one of their number. I had no means of capturing this fine specimen of our rarest mammal, and so had but to remain quiet and watch him—the best thing, by the way, a naturalist can do, nine times in ten. Presently the cat let the squirrel fall from his jaws, and then placing his fore paw upon it, he gave a long, low growl, very unlike any sound made by the domestic cat. It was repeated at short intervals, and not being responded to, as far as I could detect, the cat again caught up the dead squirrel, and bounded into the thicket. I followed as well as I could, and soon came up with him. The cat was now crouching at the foot of an enormous oak, and with much snarling and low mutterings, was tearing in pieces and devouring the little ground squirrel. In a few minutes nearly every trace of the latter had disappeared, and the cat, apparently well satisfied with his meal, curled himself up in a little patch of sunshine, within a yard of where he had been eating, and purposed, then and there, to take a quiet nap. I quietly withdrew without disturbing him, as I think, and hurried home for my gun. With great care I returned to the spot, to secure him for a museum, but he had left for parts unknown. Perhaps I may yet find him.

It is many years since the last cougar (*Felis concolor*) was killed in New Jersey; and the common wild cat, or short-tailed Bay Lynx, is now probably our rarest mammal. His habits are those of small cats the world over; or at least, such as inhabit wooded tracts of country. Unlike some of our mammals, whose habits have changed with the changes wrought by the felling of forests and general cultivation of the country, the wild cat remains just as he was in the days of the Red Indian, and the prehistoric folk before them, if they were, indeed, a different people.

During the day, as a rule, the wild cat remains at home, either *in* or on a tree, and sometimes in a hole at the roots of a large tree, when such trees are growing upon a wooded hill-side. Such a locality, a well-wooded hill-side, with a southern exposure, is the best locality for finding and studying all of our small mammals, and the majority of our birds. I have never met with a litter of their kittens, but imagine (something a naturalist ought very seldom to do, for even the "*scientific* use of the imagination" is something difficult to accomplish) they are very like those of our tame tabby, only uniform in colour.

In winter, with a good fall of snow and a full moon, the wild cat becomes a more interesting creature to study, as stealthily creeping over the snow, and seeking cover in every shadow, he steals upon unsuspecting rabbits (*Lepus sylvaticus*), or occasional mice, that have roused themselves from their hibernating slumbers. Wandering on to creek-banks, they sometimes tear open the dome-shaped nests of the musk rat (*Fiber zibethicus*), but I have never known them to eat this animal. Of the musk rat I trust soon to have a good deal to say; and if the wild cat that I saw this morning has not quitted the neighbourhood, I will let the readers of SCIENCE-GOSSIP know more of him.

CHAS. C. ABBOTT, M.D.

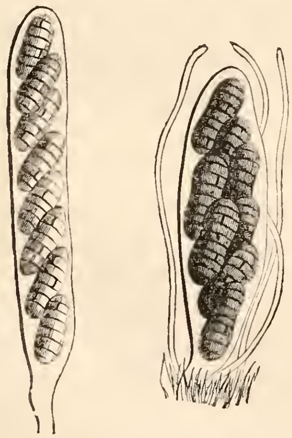
A GOSSIP ABOUT NEW BOOKS.

AMONG the many really important scientific books which have appeared since Christmas, we do not think any will be found more useful to the student and general reader alike than Dr. M. C. Cooke's work on "Fungi: their Nature, Influence, and Uses" (London: Henry S. King & Co.). It forms one of the well-known "International Scientific Series," and, with the exception perhaps of Mr. Herbert Spencer's "Principles of Sociology," is the best. The work professes to be edited by the Rev. M. J. Berkeley, M.A., by whom it was intended originally to have been written. It requires, a very cursory glance, however, to see that this well-known fungologist's part in it has been small. Indeed the latter gentleman candidly states so in the editorial preface; and we therefore suppose his

Fig. 70. Asci, sporidia, and paraphyses of *Ascobolus*. From Cooke's "Fungi."

Fig. 71. Germinating pseudospore (*b*) of *Melanpsora betulina*. From Cooke's "Fungi."

name was placed on the title-page to give an additional value to the work. We do not think Mr. Berkeley will be offended if we state that this



Figs. 72 and 73. Asci and sporidia of *Shæria pherbarum*.

is unnecessary. Dr. Cooke has done his work so conscientiously and well, has arranged his matter with such methodic neatness, and written so clearly and concisely, that we regard the book as a pattern of authorship. As to his ability to treat on such subjects, there can be no doubt that he stands next to Berkeley himself; and thus the best work on the scientific study of fungi of all kinds bears the names of the two most distinguished fungologists.

The volume contains sixteen chapters, and though the numerous illustrations are of a simple character, they are well done, as the accompanying figures,

Fig. 74. Germinating pseudospore (*g*) of Bunt (*Tilletia caries*), with secondary spores in conjugation.

kindly lent us by the publishers, will at once show. After the chapters on the "Structure," "Classification," "Uses," and "Notable Phenomena" of fungi, we have others of special interest and value,

Fig. 75. Zygospores of *Mucor phymyces*.

as including the most recent microscopical investigations. Those on "The Spore and its Dissemination," "Germination and Growth," "Sexual Reproduction," and "Polymorphism," are to our mind the most attractive. Nothing can be clearer than the detailed description of the various modes in which the spores of fungi are disseminated, especially of the micro-fungi, a knowledge of whose habits and polymorphism is of high practical value. The behaviour of many of these lowly-organized objects only shows that their modes of generation are microscopic, instead of being literally *cryptogamic*. The relations of plants, which we half figuratively and half literally term "sexual," are not limited to the true flower-bearing plants, but actually seem to exist in stronger force in those forms we have usually regarded as specially unsexual. The germination and growth of many of the micro-fungi are frequently analogous to those of the mosses and ferns, and, in the animal world, to the larval, chrysalid, and imago stages of the lepidoptera, or the "alternations of generation" of the annelida. Of these Dr. Cooke treats most lucidly, and his descriptions are richly aided by the numerous cuts. Polymorphism is one of the most curious and recently investigated characters of the micro-fungi. The same species appears parasitic

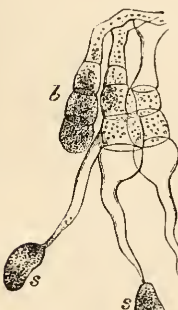


Fig. 76. Germinating pseudospore (*b*) of *Coleosporium Sonchi*; *s*, *s*, secondary sporules. From Cooke's "Fungi."

Fig. 77. Germinating pseudospores of *Phragmidium bulbosum*.

on different plants, under well-marked generic names, whereas they are only stages of development of the same plant. The long-held belief of farmers that the "cluster-cups" of the berberry-bushes had something to do with mildew, according to the experiments of De Bary, seems to have a scientific basis, and to be directly connected by intervening stages. Dr. Cooke has candidly and clearly given the exact state of all these questions. Brevity forces us to conclude with a strong and hearty recommendation to all of our readers who are students of fungi or of cryptogamic botany generally to procure this book for themselves.

Sir John Lubbock has already had his name associated with so many various subjects, and has done such good work in each, that nobody capable of appreciating it will be surprised he now appears as the author of one of the "Nature Series" volumes on "British Wild Flowers, considered in relation to Insects." (London: Macmillan & Co.) But if any one is desirous of understanding the wonderfully mutual inter-relationships which exist, even between our own commonest insects and commonest flowers, and of the reasons now suggested of "the colour, streak, and stain" which give to our wild flowers their specific characters, let them read this book. No more charming work on any subject was ever published. Those who heard Sir John's happy lecture at the Belfast meeting of the British Association, will find the same thoughts amplified and more scientifically and detailedly cast. The illustrations are numerous and apt, and assist the student materially. It is impossible for any botanical student to do without this little work, if he wishes to know the meaning of the floral mechanism of plants.

"Valleys, and their Relation to Fissures, Fractures, and Faults" (London: Trübner & Co.), is the title of a work by G. H. Kinahan, M.R.I.A. It is an elegant volume, of nearly three hundred pages, illustrated, on one of the debatable subjects in geology. As senior geologist of the Irish Geological Survey, Mr. Kinahan has had many years' experience in the field. He is a well-known physical geographer and one of our best lithologists, and few are better able to speak on the subject he has selected than himself. The most popular views of denudation now extant are those which refer all sculpturing of the geographical features of the dry land to sub-aërial processes, particularly with reference to the relative hardness and softness of contiguous strata. Mr. Kinahan's book is devoted to enumerating instances where valleys are not the result of such conditions, but were initially (at the least) commenced by faults and fissures. So far he is on the side of the Duke of Argyll, as against that of Prof. Geikie. The volume literally bristles with well-arranged facts, mostly conclusive; although we think the inferences are sometimes too rapidly drawn. There can be no doubt that sub-aërialism had pushed its conclusions too far, and this is the temptation for the other side to do likewise. But there can be as little doubt as to the value of Mr. Kinahan's work as there is to its efficient authorship; and we are convinced that it will long hold its place both in physical geography and geology as one of the best on this important subject.

At length we have a capital biography of a man whose name will always be associated with the early history of Geology—Sir Roderick Murchison. We hardly need say that it is written by his faithful friend and disciple Prof. Geikie, and now makes its appearance in a handsome, well-printed, two-volumed form. Type, paper, and illustrations (with the exception of the portrait of Prof. Sedgwick, which is a grim-looking object, not at all suggestive of its original) are all good. It is needless for us to speak of the style of the authorship—Prof. Geikie is too well known as a writer of choice and attractive English for any words of ours to add praise in this respect. But we can conscientiously affirm that the author never wrote more attractively—not even in his delicious chapters of the Life of Prof. Edward Forbes—than he has done in his memoir of Murchison. Perhaps no other geologist was so well capable of delineating the life and career of the great English geologist as Geikie. For years he had been intimately associated with him in field and library work; and although the student widely differed from the master on all the great principles of physical geology and geography, this only prompted him to estimate more highly Sir Roderick's consistent, if a trifle too geologically conservative, notions. Not even in the long life of Lyell is there more of geological and scientific history bound up than in that of Murchison, although Lyell proved himself the more earnest student in his willingness to forego long-held and long-*published* opinions, in his old age, in favour of what he believed to be the truth. Murchison's biography is incidentally the history of Geology and modern Geography. The Geological and Geographical Societies grew under him, with him, and partly by him. The British Association numbered him among its earliest founders and continuous supporters. These "giants of those days" had a battle to fight of which we moderns know little. Theological aud social animosity are no longer the necessary consequences of being a "geologist;" indeed, a slight flavour of heterodoxy has come to be regarded as "spicy," rather than otherwise. Not a few, therefore, now affect heterodoxy who cannot do anything else! But these brave pioneers of science had no time or patience for any such puerile indulgences. They expressed what they believed, because they had thought out the subjects, and held them to be the truth. Every phase of Sir Roderick's almost romantic life is well described by the biographer, from the time when he carried an ensign's flag to being baronetted for "scientific services," and onwards to his firm and unswerving attachment to the great African traveller Livingstone. We are sorry, however, to see revived the controversy between the earnest and, as we believe, mutually mistaken friends and geologists, Murchison and Sedgwick, although, strikingly enough, modern geologists are now rapidly accepting Sedgwick's geological classification. Perhaps Professor Geikie thought that the duty of a biographer was also to be a partisan, for none can be better acquainted with the controversy than himself. Apart from this, we are thankful to have such an able exposition of the life of so distinguished a geologist, and we compliment author and publisher on the manner with which this work is laid before the public.

THE USES OF TAILS IN ANIMALS.

MR. LAWSON TAIT recently delivered a lecture on this important subject, before the Birmingham Natural History Society. We give a summary of the Lecturer's remarks:—It is not difficult to imagine how the prehensile tails of monkeys, opossums, and other animals, or the fly-switches of the horse or cow, have been useful in the struggles of these animals to master their surroundings; but there are some forms of the appendage which puzzle us to see how they can ever have been availabe as assistants in survival, and still more how they are still perpetuated in their apparently purposeless forms. Amongst them the bushy tail seen in the fox, dog, cat, &c., has long attracted my attention, and no intelligible meaning of it suggested itself to me till I came into possession of a cat which is perfectly deaf, and on whom I can, therefore, perform many experiments which would be impossible in an animal possessed of hearing. Like all cats, he is very fond of a warm place, and when he is asleep nothing but a touch or a very strong vibration communicated through what he is lying upon will wake him. If he goes to sleep before a big fire, he sleeps lying on his side, at full length, with head, tail, aud limbs all stretched out. But if I place screens between him aud the heat, he gradually coils himself up, apparently without waking, covering his limbs with his tail and head, so that as little surface is exposed as possible for loss of heat. If, in addition to screening off the heat, I direct a gentle current of cold air on him by means of a bellows, he soon buries his nose in the fur of his tail, or between his tail and thigh, so that almost his whole face is protected. On re-admitting the heat, the whole movements are reversed, and he resumes his extended position. The use of the tail is clearly, therefore, completely analogous to that of the respirator worn by people with delicate chests, the object being to abstract from the expired air, by means of fur in the one case and wire-gauze in the other, the heat which is being taken out with it; so that the cold inspired air shall be raised in temperature before it reaches the lungs, and thereby conduce to a conservation of the bodily heat. Some interesting considerations bear on this. Animals provided with bushy tails seem to be so as a matter of correlation of growth, their bodies being always provided with thickly-set and more or less soft fur. I cannot find an animal with a bushy tail which cannot, and does not, lie curled up when asleep. I went round the Zoological Gardens at Dublin on a very cold morning in February, and found the civet cat, and some other bushy-tailed animals, coiled up with their noses buried in the fur of their tails. In the squirrel this use of the tail is very marked, and in birds the same object is accomplished by their burying their heads in the down of the shoulders. Animals provided with bushy tails are all solitary in their method of living, so far as I can find; and, therefore, an essential for their survival is some method by which variations of temperature shall be resisted. The use of the tail for this purpose is, I think, best of all illustrated in the great ant-eater (*Myrmecophaga jubata*), in which the hairs of the tail reach a very great size, and cover up the animal when reposing, so that he looks like a bundle of dried grass. It may also serve as a protection by mimicry in this case. Mr. Wallace states, also, that he uses his tail as an umbrella in a shower, and that the Indians divert his attention from themselves by rustling the leaves in imitation of a falling shower, and whilst he is putting up his umbrella they kill him. Some of the Myrmecophagæ have the lower end of the tail naked, and use it as a prehensile organ, whilst the upper part remains covered with long hair, and is used as a respirator. In other edentulous animals, living in tropical countries, where they are not subjected to extremes of temperature, the long hair is replaced by scales, as in the pangolins, or the tail is absent, as in the sloths. Amongst the rodents two very curious contrasts in the matter of tail are presented by the guinea-pig and the squirrel. The former is gregarious, and any one who has kept a hutch of guinea-pigs must have seen how they protect themselves from loss of heat by packing themselves in rows arranged heads and tails; whilst the squirrel is solitary, and in his nest, during his winter sleep, coils himself up and covers his face with his tail. The same is seen in the jerboa, and in the dormouse during hibernation. Of the Carnivora, those which have bushy tails are all solitary in their method of living, though the wolf and jackal hunt in packs, and those with the bushiest tails are most exposed to low temperatures, as the Arctic fox and sable. Of the Quadrumana the marmosets afford a striking instance of a bushy tail as a probable provision for protecting these delicate creatures from depressions of their temperature. I have received an interesting letter from Mr. Darwin on this point, in which he says:—"Your view is new to me, and has only to be suggested for its probability to be recognized. I presume that of course you would thus account only in part for the retention of a tail, and for its modification. Your view does not preclude the conjoint use of the tail for other service, as for gliding through the air when flattened, as in the squirrel, or as a signal to beasts of prey, in accordance with Mr. Belt's ingenious suggestion in his 'Nicaraguan Travels,' with respect to the great bushy and conspicuously-coloured tail of the skunks. I wish we knew the use of the extraordinary hairy tail of the yak, which inhabits such cold regions, whether it serves solely as a fly-flapper. If poor Dr. Falconer had been alive, he could have told us." In reply I said that I had missed the yak in my search for animals with bushy tails. But I find that he also has a long additional fringe of hair nearly touching the ground. When he lies down with his limbs drawn up to, or under him, as all ruminants do, his tail and fringe would act as a rug, preventing loss of heat from the limbs and damage to them from frost-bite—as the tissues outside the bone are thin, and there is nothing but a rather weak circulation to resist loss of heat. The yak lives close to the line of perpetual snow, which is the condition in which such epithelial appendages as he has would most conduce to survival, and, therefore, that in which they would be most easily evolved by natural selection. This seems to open out a curious study of the mechanical arrangements which exist in animals for the conservation of heat—a very important feature in the struggle of life. Some forms of tails are yet a puzzle, notably the tails of rats and mice, for which I have as yet found no reasonable explanation.

SKETCHES IN THE WEST OF IRELAND.

Chapter VII.—Aran pre-Christian Antiquities.

By G. H. Kinahan, M.R.I.A.

THE Aran islands seem to have been inhabited at a very early period, but the first-mentioned authentic record is the advent of the Firbolgs chiefs, after their defeat in the battle of South Moytura by the De Danaan. These chieftains built large duns or fortresses on the island, which are now more or less destroyed. Of these forts the principal is Dun Ængus, on Inishmore, built, according to O'Fflahertie, "about the birthtime of Christ." Its founder was Engus M'Uathmore, king of the Firbolgs. It is situated on the edge of the cliffs (279 feet high) half a mile south-west of Kilmurvy. On the land side is a thick high rampart, constructed of flaggy limestone without mortar, while outside the rampart was a *chevaux-de-frise* of long stones planted on end, similar to the one previously mentioned in Chapter V., as surrounding the caher near Corrofin, in the Burren. This dun or caher is in a very ruinous condition, and yearly it is becoming more dilapidated, it being principally destroyed by persons hunting after rabbits. One of the forts in best preservation is Dunonaght, in the western portion of the island: the name of its founder seems to be lost. Others are Dunoghil, a little south of the village of the same name, and about half a mile on the west of the last is the ruin of a large oval caher called McDoon, which by tradition is supposed to have been the strongest fort on the island. In the vicinity of these forts are the ruins or sites of two or three small cahers, the doorway of one of them being figured in Chapter V. These, however, are supposed by Mr. Kilbride to be much more modern. About half a mile south-west of Kilronan is the site of another dun. On Inishmaan, situated on a commanding crag near the centre of the island, is Dunconnor, built by Connor, brother of Engus M'Uathmore. It seems to have been larger than any of the fortresses on Inishmore. Also Dunmohen, towards the east of the island; this is very like and about the size of Dunonaght in Inishmore. On Inisheer there was a large fort called Caher-baun; this, however, is now quite dismantled, and a lighthouse built on its site.

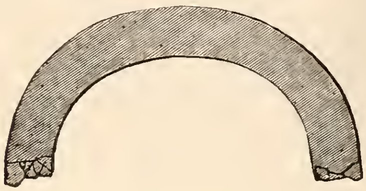


Fig. 78. Half-plan of circular Cloghaun, Cragballywee, Inishmore.

The preceding fortifications are supposed to have been built by the Firbolgs; but besides these there is on Inishmore Doocaher, *anglicè* Blackfort, a fort supposed to be much more ancient. It occupies a small promontory called Doonaghard, on the coast, a mile south-west of Killeany Bay. It seems to have been the strongest fort on the island, the rampart having been over twenty feet high. In its immediate vicinity are the ruins of what seem to have been cloghauns.

Besides the fortresses there are the ruins of habitations, some of which, such as those previously mentioned, on the south of Killeany Bay (Chap. VI.), must be very ancient. The best preserved of these are two cloghauns on the crags, half a mile south-west of the village of Onaght, in the north-west of the island; Cloghaunacarraiga, near the coast, a little north-west of Port Murvy; the village of Ballynascan, *anglicè*, the town of the ancient ones, in the valley west of Dunoghil; and the cloghauns, &c., in the Æolian sands south of Killeany Bay, all on Inishmore; while in Inishmaan, on the crag south-west of Dunconnor, are the remains of an ancient village now called Cragballywee, *anglicè*, the town of the yellow rock.

In these places are found different types of habitations, namely, cahers, cloghauns, cnocans (pronounced *Knochauns*), Ligaibreabh, Fosleacs (pronounced *Fuslocks*), and Ointigh (pronounced *Ontee*). The cloghauns on the islands are of two types, one having a round plan, as shown in the accompanying drawing of the cloghauns at Cragballywee; the second type of cloghauns is that which is most common in Aran. It has a rectangular base, a doorway in each side, and usually a window in some portion of the structure (fig. 80). Both types of cloghaun are built of flaggy limestone, without mortar, the joints in the inside being neatly and closely fitted, while on the outside the work is more rough, except the doorways and window-holes,

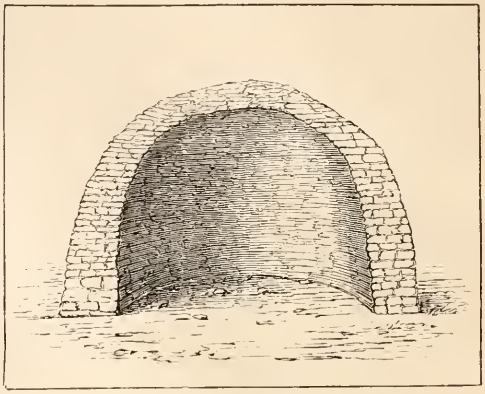


Fig. 79. Half of elevation of a round Cloghaun.

the masonry of which is carefully executed. Inside round the base are large flags placed on edge; no appliances for hanging doors or windows can be discovered, and possibly there were mats, as now used in the islands of Garumna and Lettermulle on the north of Galway Bay.

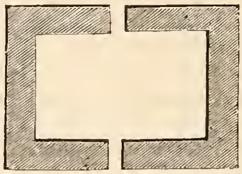


Fig. 80. Ground-plan of rectangular Cloghaun.

The round cloghauns cove inward, usually from the base to the apex, while in the rectangular structures there is always at the base a perpendicular wall about three feet high, after which they cove in, the apex of both types being finished off with flags over which shingle is placed, and all is so well finished that not a drop of rain or a breath of wind can penetrate. As previously pointed out, the round are considered to be more ancient than the rectangular cloghauns, as the latter graduate into the ointighs, and the latter into the modern cabins. Doctor Petrie seemed inclined to believe that all mortarless structures were older than those in which mortar was used. This, however, evidently is not a good test, as in some places, such as West Kerry, limestone is hard to be procured; while in others, such as Aran, there is a scarcity of fuel to burn lime; therefore in both cases, as at the present day, mortarless structures are those more likely to be built.

The rectangular cloghauns of Aran are very similar to those found on the Great Skilligs, co. Kerry, except that the latter have only one doorway, and that placed in the end, while the cloghauns in the ancient city of Faher, on the Dingle promontory, seem to have been round. The city of Faher is supposed to have been pre-Christian, while the Great

Fig. 81. Rectangular Cloghaun at S.W. of Onaght, Inishmore.

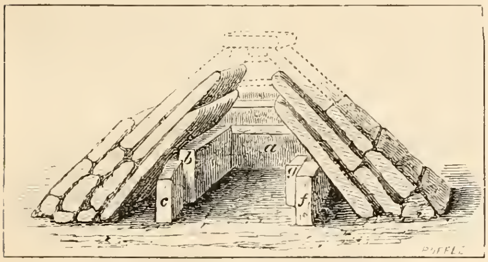


Fig. 82. Cloghaun S.E. of Louisburgh, co. Mayo.

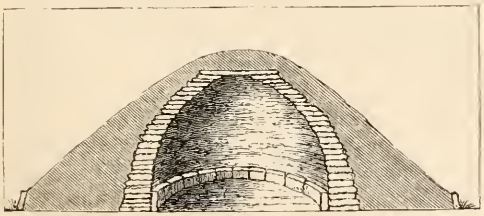


Fig. 83. Sectional elevation of a single Cnocan.

Skilligs is known to have been a penal station for refractory monks long after the advent of Christianity, and probably they, and the rectangular cloghauns on Aran, may be of post-Christian age, while the round cloghauns and the cnocans, next to be described, are pre-Christian.

A new form of cloghaun (fig. 82), not previously described, has lately been discovered in the barony of Murich, co. Mayo.

The cnocans are structures partly built of stone and partly of clay, as shown in figs. 83 and 84. For this class of habitation no ancient name is at present known, on which account we adopted for them Mr. Kilbride's name of cnocan, *anglicè* Hillhouse, used in a paper read before the Royal Irish Academy, in which were given full details of the then newly discovered settlement at Ballynasean and Cragballywee (*Proceed. Royal Irish Academy*, 1866).

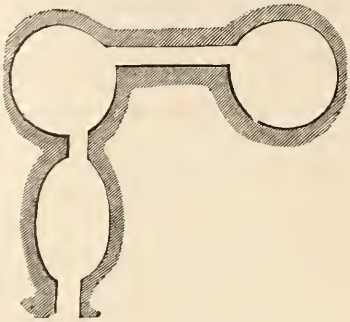
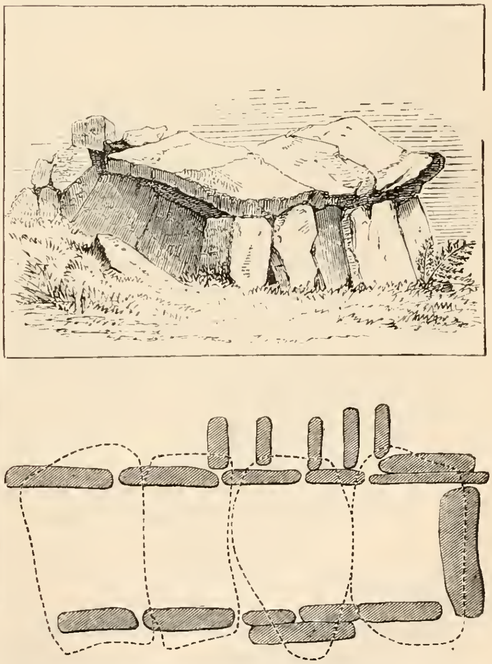


Fig. 84. Ground-plan of three-chambered Cnocan.



Figs. 85 and 86. Elevation and Plan of Calliagh Dirra's House.

Of the cnocans in Ballynasean a few have rectangular plans, one of which is divided into two rooms by a partition; but most of them have round or oval bases, and many are compound or in groups, two or more being connected together by passages built of flags (fig. 84). All inside are lined round the base with large flags placed on edge (fig. 85), behind and above which a coved wall is built; that outside is backed with clay, the structure having the appearance of a hill or mound of earth. The Ligaitreabh, or pillar dwellings, are several times mentioned in the Annals, and seem to have been structures somewhat like the fosleacs of the Burren, except that the cover-stone was supported on two or more pillars, while the spaces between were built up by small stones. Such a structure, if the small stones were removed, would look very like a cromleac, and might be mistaken for one; in some parts of Ireland they are called Labba Darmaid and Grania, or Dermot and Grania beds, they being supposed to have been resting-places for these mythical personages during their wanderings.

Fosleacs are of different types. First, simple, like those in Burren, and figured in Chapter V.; second, compound, when they are long narrow buildings with flags, walls, and roofs, as shown in the accompanying cuts (figs. 85 and 86), taken from sketches by my old friend the late G. V. Du Noyer, M.R.I.A., of a fosleac called Calliagh Dirra's House, in the parish of Monastenboise, co. Louth; and third, chambered, the latter being very similar to the second, except that the structure is divided by transverse flag partitions into two or more compartments.

The Ointighs, or stone huts that have not arched or beehive-shaped roofs, seem to be much more modern than any other of the habitations mentioned, and must be post-Christian. They, however, are mentioned, as here they occur in connection with the others, they seem to be the passage between the rectangular cloghauns and the present cabin.

In Ballynasean there are cahers, chambered, round, and rectangular cnocāns, rectangular cloghauns, one ligaitreabh, two fosleacs, and a few ointighs, all more or less destroyed; while in Cragballywee there is only the one cloghaun at all perfect (figs. 78 and 79), but the site of several cloghauns and cnocāns can be traced out.

THE HISTORY OF CULTIVATED VEGETABLES.

No. X.—The Pea (*Pisum*).

The Pea, like the Bean, has been used for food for an unknown period, and it is an interesting fact that the bean and a small kind of pea, allied to the present variety, have been found in the lake habitations of Switzerland, which existed in the Stone and Bronze ages. We have no account that the Greeks and Romans numbered green peas among their numerous dishes, although we are told that in their mature state the common people made the grey pea their principal food. According to Martial, they were sold at the theatres and circus at a low price to the spectators, who regaled and even gorged themselves with fried peas; and it is related by some Roman writers that those who were candidates for any public employment used to distribute grey peas gratuitously to the people, in order to obtain their suffrages. From which it appears that votes were to be had at a much cheaper rate than in the present day.

Pliny informs us that the Greeks sowed their peas in November, but the Romans did not plant theirs until the spring, and then only in warm places lying well in the sun; for of all things, says this author, the pea cannot endure cold.

Historical evidence would make it appear that both the pea and the bean must not only have been introduced, but extensively cultivated in some parts of Scotland, as well as in England, at a very early period. It is on record that when the English forces were besieging a castle in Lothian, in the year 1299, their supply of provisions was exhausted, and their only resource was in the peas and beans of the surrounding fields. It was not until after the Norman Conquest and the establishment of monastic communities that we read of green peas being used. In Fosbrooke's "Brit. Monasticon" it is stated that at Barking Nunnery the annual store of provision consisted, *inter alia*, of green peas for Lent; green peas against Midsummer; and in "Archæologia," vol. xiii., in Order and Goverument of a Nobleman's House, it is there mentioned: "If any one will have peas soon in the year following, such peas are to be sown in the waine of the moon at St. Andro's tide, before Christmas." It appears from a song called "London Lychpeny," written in the reign of Henry VI., that peas cods or pods were sold in the streets of London at that period:—

> "Then into London I dyde me hye
> Of all land it bearyeth the pryse;
> Gode pescode one began to cry."

At Windsor there is a street called Peacod, mentioned by that name in old documents. Perhaps a more delicate variety was introduced about the reign of Henry VIII., for in the privy purse expenses of that king is the following entry: "Paid to a man in reward for bringing pescodds to the King's grace, iiijs. viiid." Yet garden peas appear to have been rare in the early part of Elizabeth's reign; as Fuller observes they were seldom seen, except those which were brought from Holland, and "these," says he, "were dainties for ladies, they came so far and cost so dear"; but in the latter part of her reign gardening had made considerable progress; and, taking into consideration how little it had been previously studied, her days produced the most Complete Herbalist, who studied and wrote upon all plants known at that period. Gerard's work is as excellent as it is voluminous, being free from those astrological absurdities that disgrace the Herbals of Culpepper and others, who wrote about the time of the Commonwealth. A mind like Gerard's would be above such ridiculous superstition, and would know that a knowledge of herbs would be sooner gained by looking down to examine plants, than by lookiug up to observe the planets. This author informs us that one variety of pea is indigenous to this country; he says: "The wild pea do grow in pastures and arable fields in divers places, especially about the fields belonging of the Bishops Hatfield, in Hertfordshire." He adds, "There be divers sorts of peason, differing very notably in many respects, some of the garden, and others of the field, and yet both counted tame; some with tough skins or membrances in the cods, and others have none at all; whose cods are to be eaten with the peas when they be young as those of young kidney beans; others carrying their fruit in the tops of the branches are esteemed as Scottish peason, which are not very common." He also describes the wild and the everlasting pea, which perhaps may be some of the varieties of Lathyrus or Vetchling.

Tusser has the following passage in his "Five Hundred Points of Good Husbandry." For the month of January, he says:

> "Dig Garden, stroy mallow, now may ye at ease,
> And set (as a daintie) thy runcival pease."

Rouncival was an old word for large and strong, derived from the gigantic bones of the old heroes pretended to be shown at Roncesvalles. Hence the word became a common epithet for anything large or strong, as Rouncival peas, the large sort now called marrow-fat (see Timb's "Things not Generally Known").

Green peas became a popular delicacy in England soon after the restoration of Charles II., and, strange enough, even for late ones, so early as 1769, as it is a matter of history that on the 28th of October of that year a guinea a pottle—not quite half a dish—was given at Covent Garden market; and as much as ten times that sum has been paid since in the same market for a quart of green peas shelled.

There are many curious and superstitious customs with respect to peas and beans, related in Brand's "Popular Antiquities." I will just mention one or two. 1st. On Carling Sunday—the Sunday before Palm Sunday—at Newcastle-upon-Tyne, and many other places in the North of England, grey peas, after having been steeped a night in water, are fried with butter, given away, and eaten at a kind of entertainment. They are called Carlings, probably as we call the presents at fairs, fairings. From what the custom arose is uncertain, but one old author states that it took its rise from the disciples plucking the ears of corn and rubbing them in their hands. The efficacy of pea-cods in love affairs is also one of the popular superstitions alluded to by Touchstone in "As You Like It," act ii. scene 4, and it is said still practised in Suffolk and other parts of the country. The kitchen-maid, when she shells green peas, never omits, if she finds one having *nine* peas, to lay it on the lintel of the kitchen-door, and the first clown who enters it is infallibly to be her husband, or at least her sweetheart.

The pea goes through all the stages of its vegetation in a very brief period. More than one instance is on record of a crop being obtained from seed matured the same season. In Fleming's "British Farmer's Magazine," November, 1826, it is stated that some Spanish dwarf peas were sown in February, and the crop was reaped the first week in July. Some of the pods were left to mature their seed, which, when sufficiently ripe, were again committed to the earth on the same piece of ground, and a second crop was reaped on the 27th of September.

The varieties and sub-varieties of the common pea are never-ending. These have obtained their names, some from imaginary qualities, some from the peculiar mode of culture, others from the persons who first produced them, and some from more fanciful distinctions. The native country of the pea, like most of our cultivated vegetables, is not known. Valmont Bomare says the garden-pea was originally of France. Coles informs us, in his "History of Plants," that "the Fulham pease, which came first out of France, are so called because the grounds about Fulham, near London, do bring them forward soonest."

The English name appears to be a corruption of the Latin *pisum*. Tusser and Gerard both wrote it peason. Dr. Holland, in Charles I.'s reign, spells it pease, since abbreviated into pea.

The Sea-pea, *Pisum maritimum*, now *Lathyrus maritimus*, is a native of this country. It grows on pebbly beaches, very rare and local. It differs from the other esculent peas in being a perennial, the root striking deeply into the ground among stones and sand by the seashore. This pea is hard and indigestible, but it is said to have saved many persons from perishing by famine in the year 1555.

I will conclude this article with an extract from a paper on the Historical Notes of Cultivated Plants, in the *Horticultural Society's Journal*, vol. ix. "The pea has been stated by several authors to be a native of Italy, and Professor Targioni admits this to be the case with the field pea (*Pisum arvense*); but most botanists insist on the garden pea (*P. sativum*) being a distinct species of unknown origin." In this conclusion we cannot join, all our cultivated *Pisum* are surely referrible to one species, which is most probably really indigenous in the more eastern districts, where it is now found apparently wild. Lentils (*Ervum Lens*), which are also used for food, will be the subject of another article.

The Lentil, although not grown in England as food for man, is largely cultivated in some parts of the Continent for culinary purposes. The earliest mention we have of them, is in the Bible, when Esau sold his birthright to his brother Jacob for a mess of lentil pottage. The Egyptians and Greeks highly esteemed this vegetable, and their ancient philosophers not only regaled themselves with lentils, but took care to cook them themselves; for it was one of their proverbs, "That a wise man acts always with reason, and prepares his lentils himself."

The Romans considered that the use of this pulse produced heaviness to the mind, and rendered man indolent and lazy; for this reason, no doubt, as Plutarch informs us, Marius Crassus, when waging war against the Parthians, was convinced that his army would be defeated because his corn was exhausted, and his men obliged to have recourse to lentils.

Pliny nevertheless assures us that this food produces an uncommon virtue—evenness of temper. The ancients used lentils to thicken pottage instead of barley groats, for those who had weak stomachs. The Roman physicians boiled them in vinegar to disperse all hard tumours occasioned by scrofula, &c., and as a cure for erysipelas they boiled them in sea-water. Lentils appear to have been brought to this country in 1548. Gerard says he had been informed that they were sown in his time in Middlesex, and other places in England for cattle, in the same manner as other tares. Coles, writing in 1657, mentions that the inhabitants of Hampshire called lentils Jills, and in Oxfordshire they were known by the name of Dills in his time. Lentils are cultivated in the South of Europe, the East, and Egypt, where the seed forms a very important article of food. Near the Cataracts of the Nile the inhabitants make their bread entirely of lentils, corn being very scarce in that part of the country. Dr. Kitto tells us that he has often partaken of red pottage, prepared by seething the lentils in water, and then adding a little suet to give them a flavour; the mess, he adds, had a redness which gained for it the name of Adom ("Hist. Bib."). This pulse is much used in Roman Catholic countries during Lent, and it is said by some authors that this season derives its name from this cause. The flower of lentils is considered very wholesome, and Dr. Playfair found it contained more nitrogenous matter than any of the leguminiferous plants; and as a proof of its nutritious qualities the Hindoos always have recourse to lentils in addition to their rice, when engaged in laborious work. Those substances which are sold under the name of Revelenta Arabica and Ervelenta Arabica are nothing else but the flour of lentils (*vide* Hogg's "Veg. King.").

HAMPDEN G. GLASSPOOLE.

SPIDERS' WEBS AND SPINNERETS.

BEFORE proceeding to the consideration of the spinnerets of spiders of the genus *Ciniflo*, and describing the methods for the preparation of specimens, I will endeavour to answer the questions that have been asked me concerning the webs of the *Epëiridæ*, first, however, relating a few facts that bear upon the subject.

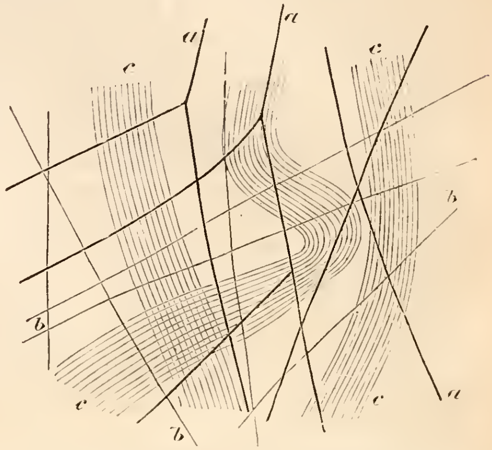


Fig. 87. Web of *Argyroneta aquatica*, showing method of constructing the cocoon. (*a*) first threads, (*b*) second threads, (*c*) third threads.

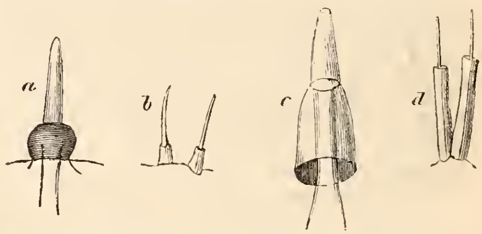


Fig. 88. Spinning-tubes from spinnerets of *Epeira diadema*. (*a*) large spinning-tube, and (*b*) small spinning-tubes of third spinneret; (*c*) large spinning-tube, and (*d*) small spinning-tubes of first spinneret × 165 diams.

I wish to draw more particular attention to the idea that three is the normal number of varieties of threads in a spider's web, each kind being produced by its special pair of spinnerets. Further, seeing that two of the threads differ only in size, I consider that they are produced by the first and second pairs of spinnerets, because the construction of these is generally almost identical. The remaining thread, which is often very peculiar, being therefore the product of the third spinnerets, because this pair is constructed on a plan different from that of the other two. Since writing my former article I have examined the webs of various genera of spiders. In a *Theridion's* web the threads seem all alike; in a *Linyphia's*, *Argyroneta's*, and *Agelena's*, there are but two kinds; while in a *Lycosa's*, *Tegenaria's*, and

Epëira's there are three, and in a *Ciniflo's* four. I am aware that the *Lycosidæ* do not ordinarily spin webs; but various specimens of *Lycosa piratica*, which I kept in an aquarium, spun little patches of web on the glass.

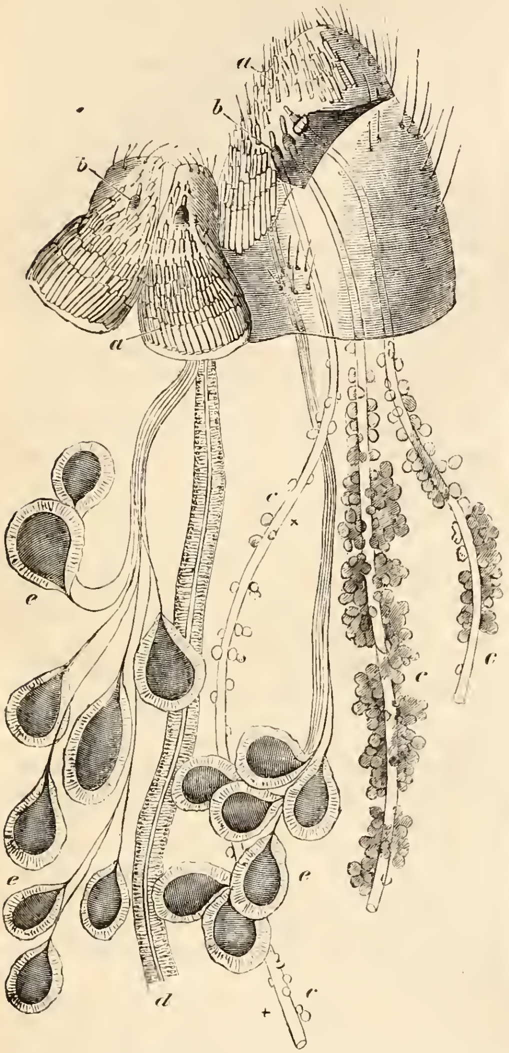


Fig. 89, × 40 diams. One first spinneret, and the second pair of spinnerets of *Epëira diadema*. (*a a*) common spinning-tubes; (*b b*) large spinning-tubes; (*c c*) ducts leading to the glands of large tubes (*b*) of first spinneret; (*d*) duct leading to gland of the large tube (*b*) of second spinneret; (*e e*) some of the glands and ducts of the common spinning-tubes.

In those webs which appear to contain but two threads I am inclined to think that the missing thread is to be looked for in the cocoon; for this reason. I have always wondered how it is that spiders manage to spin their cocoons of so close a texture in such a short space of time. A water spider which I was keeping in a bell-glass, very kindly solved the mystery. This particular spider took a fancy to live outside the water instead of in it, and not being able to stand on the perpendicular glass, she spun a small patch of close-textured web as a holdfast. On examining the centre part of this patch, it appeared, both to the naked eye and with a microscope, just like a piece of the cocoon. Certain broad threads at the edge of the patch at once

Fig. 90. One third spinneret of *Epëira diadema*. (*a*) common spinning-tubes; (*b*) large spinning-tubes. The Glands,—C; (*e*) *cæca* or gland-tube; (*f*) *glandular epithelium*; (*g*) the outer skin of the gland; (*h*) duct; (*d*) ducts belonging to the two large spinning-tubes (*b*) × 40 diams.

explained the method by which this close and even texture of the cocoon is obtained. They are represented by fig. 87 (*c*) as they appear under a microscope. Remembering how a garden spider winds its prey in a silken covering, I at once understood that they are produced by the spider erecting, or placing parallel to its neighbour, each separate spinning-tube, so that the threads which they give out do not touch, instead of directing their tips towards one point; in which case the threads would join in one, and so form but a single thread instead of a band of many threads. As I can distinguish two sizes of threads besides these bands (as shown in the figure at *a* and *b*), I imagine that the bands are the product of the third spinnerets, while the two threads are emitted by the first and second spinnerets.

I now come to the spinning of the webs of the *Epëiridæ.* First let me correct an error in my former paper. I stated, that when enveloping a fly in its silken shroud, the spider employs silk from all six spinnerets. This is incorrect; the first pair alone is used.

A good deal has been written about the way spiders throw their threads across open spaces. What force propels the threads I cannot say, but *how* they go I can. One calm afternoon I was amusing myself by keeping a spider on a short piece of stick, by just winding up her thread as fast as she let herself down. The thread when broken and left hanging (mark this), showed no tendency to blow out. But the spider got tired of my little game, and after having several times, by breaking the thread, dropped herself to the ground only to be picked up again, she tried a new dodge. Still hanging by her thread, she shot out several others, each composed of many detached threads, which blew about at once, and one of them catching in a twig, the spider very coolly walked away. It seems to me evident that a spider's thread when entire is heavy enough to resist a gentle breeze; but when the strands of which it is composed are separated, even the slightest breath of wind has an influence on it.

It is on the spinning of the ordinary geometrical webs, however, that I wish to say most. I pass over the first stages of the process, because accurate descriptions may be found in many books. After all the radii have been set, the spider, beginning at the centre of the web, draws round and round a spiral thread until she reaches the circumference, and then, commencing at some point in the circumference, just reverses the process. This is in effect the description which I have met with in several books, and it is correct as far as it goes; but then it does not go far enough. The thread, which is begun at the centre, and finished at the circumference, *has no viscid globules.* But in a perfect web all the circular threads are studded with these sticky beads. How is this? A garden spider cannot walk over its web with impunity any more than a fly can; nor does it ever go on the web except to catch a fly, and in so doing it breaks every viscid thread on which it steps, being sufficiently strong in the legs to avoid entanglement. Now the radii of the web, towards their extremities, are too far apart for the spider to step from one to another. So, in making her web, she first spins a non-viscid thread, beginning at the centre and finishing at some point in the circumference. On her return journey, when leaving the viscid thread behind her, the divisions of the previously spun plain thread are used as bridges by which to get across the broad spaces between the radii. Also, when this thread itself was being spun, the parts of it already finished served the same purpose, namely, that of enabling the spider to step from one radius to another. The reason for its being non-viscid is obvious: if it were sticky, the spider could not walk on it. But it is highly important that the completed web should be as effective as possible for catching flies, and if the threads were alternately viscid and plain its efficiency would be much impaired; therefore, as there is no further use for the plain thread, the spider bites off each division as soon as she has passed over it, leaving only a small portion in the middle of the web, and in this place she is wont to sit.

For the reasons stated in the beginning of this paper, I consider that the radii of the web are the product of the first spinnerets; the non-viscid spiral thread the product of the second; while the viscid thread belongs to the third pair.

Thus far my observations are straightforward enough, but when, by means of dissections, I come to consider the actual production of the viscid globules, I am rather at a loss, and the little I can make out tends considerably to upset the neat little theory propounded above.

I am inclined to think that the viscid beads are produced by some apparatus independent of the ordinary spinning-tubes on the spinnerets (whichever pair it may be that produces them), for these reasons: Firstly, because by very careful rubbing with a thread of glass the globules may be removed from the spider's thread, which proves them to be no constituent part of it; and secondly, because I cannot, with the most careful observation, detect any difference in the spinning-tubes of spiders which do and do not spin viscid threads sufficiently great to account for the remarkable difference of their threads.

Now on the interior margins of the third spinnerets of every spider that I have examined, are two spinning-tubes very much larger than their neighbours. (See *a*, fig. 88, compared with *b*, and also examine *b*, fig. 90.) These are briefly noticed in SCIENCE-GOSSIP for 1874, page 181. They are connected with two very large glands, which differ somewhat in construction from the glands of the small spinning-tubes. Fig. 90 shows the two large tubes, and also part of the ducts (*d*) leading to the glands: these are not represented, inasmuch as they would take up too much space, for they would lie below the common glands there figured, and be very much larger. As it seems probable that in attaching their threads to objects and in constructing their cocoons all spiders require some viscid material, it is likely that these glands and tubes produce it.

But, on the other hand, in the Epëiræ, on each of the first spinnerets are three spinning-tubes of a still more peculiar character than the large tubes on the third spinnerets. These are very well shown at fig. 89, *b*, and there is a larger figure of one at fig. 88, *c*. Not only do they differ in shape and size from the rest of the tubes on the spinneret (compare *c* and *d*, fig. 88), but they are placed on a thickened plate of chitine, and the glands belonging to them are of very large size. In a large Epëira they measure $\frac{3}{20}$ or $\frac{4}{20}$ of an inch in length, while a common silk-gland (*e*, fig. 89) is about $\frac{1}{100}$ of an inch. Like the similar glands of the third spinneret, they are not represented, because they are too large; but their three ducts are drawn, and it will be seen that they have a covering of most curious globular cells (perhaps themselves glands), which are so slightly attached to them as to be easily rubbed off during manipulation (see the duct marked × +). At present I have been unable to detect anything analogous to these glands in the spinnerets of any other genus, except in a foreign spider, a Nephila, which seems very nearly allied to the Epëiræ. Now I believe that the Epëiridæ are the only family of (British) spiders which spin viscid webs; wherefore I think it not unreasonable to conclude that it is the office of these glands and spinning-tubes to produce the viscid gum.

This conclusion, if correct, goes against my notion that the viscid threads are formed by the third spinnerets; but one thing I may mention,—I am sure non-viscid threads *are* produced by the first spinnerets, because I have seen them in the act of being spun.

In fig. 89 are shown a few of the glands belonging to the common spinning-tubes, *a* (see also *d*, fig. 88), which secrete the silk. These are the glands corresponding to that one shown at fig. 121, p. 181, in SCIENCE-GOSSIP for 1874, as belonging to a Tegenaria. It will be seen that, although different in hape and somewhat smaller, their construction is essentially the same. They vary a good deal both in form and size, in different individuals. At *b*, fig. 89, on the second spinnerets, are shown two extra large spinning-tubes, which may have something to do with the viscid globules; and at *d*, on the same figure, is shown what I believe to be the gland belonging to them. I am uncertain whether it has a blind end, or whether it expands into a sac.

At *C*, fig. 90, are some of the ordinary glands of the third spinneret. My description of the corresponding glands in a Tegenaria was, as I have since found, very incorrect; so I will just describe these. A gland consists of, first, an outer membrane, *g*, on the inner surface of which is a layer of columnar epithelial cells, *f*. These absorb, by endosmosis, the constituent parts of the silk secretion from the fluids in the body, and discharge it as perfect liquid silk into the cæca or gland-tube *e*. From this it is conducted by the duct (*h*) to the spinning-tube (*a*). This description of the method of secreting the silk applies equally to the other glands.

H. M. J. UNDERHILL.

(*To be continued.*)

MICROSCOPY.

PRISMATIC MOUNTING SLIPS.—It is a fact well known to microscopists that structural detail is more easily detected when viewed in an oblique direction. Oblique vision must not however be confounded with oblique light. In the former case the object forms an angle with the eye or object-glass; in the latter the object lies parallel, and merely illuminated by an oblique pencil of light. The closeness of the front lens in objectives of high magnifying power prevents the object being viewed in an oblique position. To overcome this difficulty, Mr. F. H. Wenham proposes the following plan :—

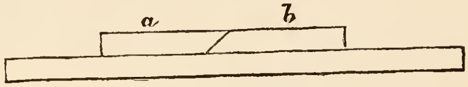


Fig. 91. Prismatic slips.

A slip of glass $\frac{4}{10}$ wide has one of the edges polished off to an angle of 35°, if for dry objects (for balsam mounting an angle of 45° is preferable). The above diagram represents a slide, with prismatic slips *a* and *b* attached. The objects to be mounted, such as diatoms or insect-scales, are placed as near the knife-edge of the prism (*a*) as possible; those situated nearest the edge may be viewed by the highest powers. The slip thus prepared may then be fixed with a drop of balsam on an ordinary slide. Another slip (*b*) has its incline pressed against it so as to lay the object flat against the two inclines. The lower prism is necessary, for without it a deal of offensive colour enters the object-glass from the decomposition of the transmitted light. This is recomposed or neutralized by the under prism, which also greatly increases the obliquity of the ray by refracting this to the same angle as that of vision from the deflection of the axial ray of the object-glass. A more fully detailed account of the action of these prismatic slips and the method of making them will be found in the April part (No. 76) of the *Monthly Microscopical Journal.*

MICROSCOPIC QUERY.—I shall be glad to hear from any correspondents who possess a "Beck's Popular Microscope" what they have been able to do with their quarter-inch in the way of resolving best diatoms. I may say that I can with mine show very fairly the three readings of *P. angulatum* and the lines in *P. quadratum*.—*Edwd. Howell.*

ZOOLOGY.

The Colouring Matter of Birds' Eggs.—At a recent meeting of the Zoological Society, Mr. H. C. Sorby, F.R.S., read a paper on the colouring matter of the shells of birds' eggs as studied by the spectrum method, in which he showed that all their different tints are due to a variable mixture of seven well-marked colouring matters. Hitherto the greater part of these had not been found elsewhere. The principal red colouring matter was connected with the hamoglobin of blood, and the two blue colouring matters were probably related to bile pigments; but in both cases it was only a chemical and physical relationship, and the individual substances were quite distinct, and it seemed as though they were special secretions. There appeared to be no simple connection between the production of these various egg-pigments and the general organization of the birds, unless it were in the case of the Tinamous, in the shells of the eggs of many species of which occurs an orange-red substance not met with in any other eggs, unless it were in those of some species of Cassowary.

Anodonta cygnea.—In answer to A. W. Langdon, Hastings (Science-Gossip, May), the *Anodonta cygnea* he speaks of is a very fine shell. I have seen only two larger in size; one 8½ inches, and one upwards of 9 inches,—taken from the river Dart. I get them sent to me from different counties in England. As a shell-dealer and collector for forty-five years, I think I may say the river Dart produces the finest of this class I have yet seen. There are also very fine *A. cygnea* to be found in the river Exe and in the Teign.—*A. J. R. Sclater, Teignmouth.*

BOTANY.

Giant Trees.—Great trees have been found in Australia which exceed the giants of California in height, though not in circumference. One fallen tree in Victoria measured 420 ft. in length, and another 480, while the highest yet discovered in California reaches only 450 ft.

Birds and Flowers.—The ravages of birds among the crocuses and other spring flowers were the subject of some remark in all the scientific journals last year, and keener observation has been directed to it this spring. It now appears, from further observations, that the birds rarely if ever touch the white flowers. In the London Parks the yellow crocuses have been cut to pieces by them.

Ornithogalum pyrenaicum.—Syme says of this plant, some authors divide it into two species—*O. pyrenaicum* and *O. sulphureum*; and he thus mentions an attempt he made to discriminate them:—"By the kindness of M. Lenormand I received from Professor Boreau living roots of his *O. pyrenaicum* and *O. sulphureum*; the former throve and flowered in London, and was precisely similar to the Bath plant sent me alive by Mr. T. B. Flower. *O. sulphureum* never flowered, and died after the second year: it had leaves much less glaucous than the other." As this interesting Star of Bethlehem is now coming into flower near me, I should much like to know the specific differences of the two above mentioned, that the Sussex plant may be correctly designated, and for any help on this matter through the medium of the pages of Science-Gossip shall be greatly obliged. The leaves of the *Ornithogalum pyrenaicum* (?) growing here are decidedly glaucous. —*F. H. Arnold, LL.B., Fishborne.*

Botanical Experiments.—It may interest some of your readers besides "Agnes Lury," whose Botanical Experiment is recorded in the May number of Gossip, to hear the result of a somewhat similar experiment made by me so long ago as the year 1844,—an experiment which has often been made, no doubt, but which is worth repeating, as it affords so excellent an opportunity of watching the early stages of germination and growth. The subject of my experiment was not an acorn, but a horse-chestnut, which offers some advantages in the way of rapid development; and instead of putting it into a bottle of water, as your lady correspondent apparently did, I suspended it, by means of copper wire, in one of the old-fashioned tall hyacinth-glasses just a little above the surface of the water. The wire for this purpose may even be passed through the nut, so it interfere not with the germ. The mouth of the glass vessel was then carefully covered over with tinfoil, gummed on, so as to be air-tight, or as nearly so as possible. The changes of temperature of the room in which the vessel was kept caused a continual rise and precipitation of dew, sufficient to keep the horse-chestnut thoroughly damp, and soon to cause germination, the radicle descending to, and presently entering the water; the plumule ascending towards the tinfoil, which presently had to be pierced to allow of the upward growth of the young tree. From the time that the tinfoil was thus pierced there was, of course, waste of the water, which needed renewing from time to time; but with careful watching my young tree throve apace through the winter. As spring came on, it was gradually inured to the outward air: it continued so to thrive that it had to be removed to a garden pot of earth, in which I left it. After many years' absence from England, I returned, and was shown my tree, which had been planted out in a friend's shrubbery; and there it still is, a good-sized tree, though probably the manner of its early education has had some effect upon it through life, as we know our early education ever will have; for I do not think it is so large or so vigorous a tree as under ordinary circumstances it should have been in the course of upwards of thirty years. It flowered for the first time only a couple of years ago. I have no doubt that precisely the same process might be followed, with great interest, with an acorn; and though the youth of such a tree may be delicate, there is no necessity whatever for it to die when put out of doors and exposed to the outside air, so only a little kindliness be shown in the nursing.—*J. G. Halliday.*

LATHRÆA SQUAMARIA.—A new habitat has been discovered for this plant in Cumberland. Single specimens had previously been found in two or three places in the county, but they being removed had no successors. In the middle of last month, however, a neighbour of mine accidentally lighted upon a large patch of that somewhat rare flower,—and a very beautiful flower it is when fresh gathered. There is no doubt of the reality of the find, as at least half a dozen plants were brought away which I myself saw. These specimens differ in some points from the plate and description in Syme's Sowerby. The flowers are not white, the calyx being pale primrose, and the corolla tinged with purple, more particularly in the inside. The calyx, peduncle, and stem are thickly clothed with long white hairs, and the stigma not purple but yellow. The specimen given to me is about eleven inches in height, and, though nearly fully flowered, is considerably more bent over than in Sowerby's figure. It is a plant worthy of cultivation. I suppose it could not be transplanted. Perhaps it might succeed by seed. Could any of your numerous readers give any hints how to manage it?—*R. W.*

THE EUONYMUS.—I have noticed how this plant flourished at Brighton, as mentioned by "T. B. W." (p. 115), and think he may be interested in learning that it thrives equally well in London. In the North-eastern district, with which I am more particularly acquainted, it is to be seen in nearly every garden of modern date, and generally looks in a very healthy condition. A judicious use of the pruning-knife, however, is necessary to keep it in good order, for, if this is neglected, it is apt to present in the course of a few years a scraggy appearance. As far as my own experience goes, the foliage of evergreens is tolerably exempt from the attacks of insects; the poisonous properties of the leaves of some, and the dry and leathery nature of the leaves of most, doubtless rendering them unfit for the food of larvæ, but I find the young leaves of the Euonymi in our own garden are eagerly devoured by caterpillars ("Loopers"), whose ravages soon make the fresh shoots quite bare.—*W. R. H.*

THE POTATO-TREE (*Solanum crispum*).—This plant, noticed in a former number of SCIENCE-GOSSIP, raised from cuttings last summer, is now in full flower, though not more than six or eight inches high, in the various greenhouses here. If allowed, it will grow to an elegant evergreen tree fifteen feet or more high; but as it may be dwarfed in pots, it will, no doubt, become a great favourite, and is, therefore, being extensively cultivated with that view. Its early flowering when so young will, no doubt, prove a great recommendation.—*T. B. W., Brighton.*

MAIDEN-HAIR FERN (*Adiantum Capillus-Veneris*).—On the 4th instant I found this beautiful fern growing in moderate abundance on the west coast of the Isle of Man, near the village of Glenmayo. The young fronds were just peeping from the opening in the rocks, some ten to fifteen feet above high-water mark. I mention this fact because I have noticed that several writers, in mentioning it, have confined its occurrence to the more southern parts of England and Ireland.—*H. J. Marsden.*

GEOLOGY.

SLATY CLEAVAGE.—In SCIENCE-GOSSIP for May, Mr. H. P. Malet gives me credit for a suggestion that in my book he will find belongs to no mean authority—Dr. Haughton. To me it appears that Mr. Malet's theory, or any other as yet proposed, to explain the production of cleavage in rocks, although they may answer in some cases, will not be satisfactory in all the various aspects under which it occurs. Slaty cleavage generally is best developed in the older rocks, but good examples occur in the newer, while Agassiz has recorded it in recent accumulations, and Sorby and Haughton have produced it artificially. Cleavage may be vertical or acute to the plane of bedding, and the rocks in which it is found may be thin-bedded, current-formed rocks, deep-water accumulations, igneous rocks, or chemically formed; it may be well or badly developed or pass into jointing, as demonstrated by Prof. W. King. In some areas it only is found if the rocks are crumpled and folded, while in other places it may occur in undisturbed rocks. In some crumpled and folded rocks the strike of the cleavage always is parallel to the axis of the main curve, while in other areas it has a general strike irrespective of the folds and crumplings. In one part of a district the rocks may be cleaved, while in the rest, although the rocks are similar and apparently similarly circumstanced, they are uncleaved. In some areas only the argillaceous rocks are cleaved, in others all the rocks. In some places the cleavage is perpendicular, or nearly so, in the pure argillaceous rocks, while as they become arenaceous it flattens; but in others the phenomena are exactly opposite. Various other peculiarities in connection with slaty cleavage might be enumerated, but sufficient have been mentioned to show its complications. Twenty years ago I believed I was master of the subject, now I know my ignorance.—*G. H. Kinahan.*

Occurrence of Phosphates in the Cambrian Rocks.—At a recent meeting of the Geological Society a paper by Henry Hicks, Esq., F.G.S., was read on this subject. The author showed from experiments that the Cambrian strata in Wales contain a far greater amount of phosphate and carbonate of lime than had hitherto been supposed. The results published by Dr. Daubeny some years ago, and which have since received the support of some eminent geologists, were proved therefore to be entirely fallacious when taken to represent the whole Cambrian series; for though some portions show only a trace of these ingredients, there are other beds, both interstratified with and underlying these series, which contain them in unusually large proportions. The author, therefore, objects to look upon Dr. Daubeny's experiments as tending in any way to prove that the seas in which these deposits had accumulated contained but little animal life, and that we had here approached the borders of the lower limit of organic existence. He contended that the presence of so much phosphate of lime, and also of carbonate of lime, as was now proved by analyses made by Mr. Hudleston, F.C.S., Mr. Hughes, F.C.S., and himself, to be present in series of considerable thickness in the Longmynd group, Menevian group, and Tremadoc group, proved that animal life did exist in abundance in these early seas, and that even here it must be considered that we were far from the beginning of organic existence. The amount of phosphate of lime in some of the beds was in the proportion of nearly 10 per cent., and of carbonate of lime over 40 per cent. The proportion of phosphate of lime, therefore, is greater than is found in most of what have been considered the richest of recent formations. The amount of P_2O_5 was also found to increase in proportion to the richness of the deposit in organic remains. It was found that all animal and vegetable life had contained it from the very earliest time; but it was apparent that the Crustacea were the chief producers of it in the early seas; and of the Crustacea, the trilobites more particularly. It was always found where they were present, and the shell of some of the larger trilobites, as now preserved, contained as much as from 40 to 50 per cent. of phosphate of lime. The analysis made by Mr. Hudleston and the author of "Recent Crustacea" proved that they also contain P_2O_5 in very considerable proportions. In the second part of the paper the author showed that where intrusive dykes had passed through or between the beds containing the phosphate of lime, the beds for some distance on each side of the dykes had undergone a considerable change. Scarcely a trace of the P_2O_5 or of the lime was now to be found in them, though it was evident that before the intrusions into them had taken place, they, like the other portions of the beds, had evidently contained both ingredients in considerable proportions. It was well known that heat alone could not separate P_2O_5 from lime; therefore he found it difficult to account for this change in the character of the beds, unless it could be produced by gases or watery vapour passing into them at the time the intrusions took place. He thought it even probable that the dykes, which in some parts are found to contain a considerable amount of lime and also of P_2O_5, might have derived these, or at least some portions of these, from the beds through which they had been forced, and which must have been broken up and melted as they passed through them. There are no contemporaneous tuffs known in Wales of earlier date than the Llandeilo beds; and he thought these dykes belonged to that period, and that they were injected into the lower Cambrian beds after from 8,000 to 10,000 ft. of deposit had been superimposed. In an agricultural point of view the author considered that the presence of so much phosphate of lime in some of the series of beds must be a matter of great importance; and on examining the districts where these series occurred, he invariably found the land exceedingly rich. Mr. Hudleston gave the results of the analyses made by him at the request of Mr. Hicks. He found in a portion of dark grey flaggy rock taken from close to a fossil 1·62; in a portion of black slaty rock containing trilobites, but in contact with trap, 0·11; in a portion of the shell of a trilobite 17·05; and in the trap above mentioned 0·323 per cent. of phosphoric anhydride. A lobster-shell dried at 100° C. gave 3·26, an entire boiled lobster (undried) 0·76, and a boiled lobster without shell 0·332 per cent. of P_2O_5. If the analysis of an entire lobster be correct, he estimated that a ton of boiled lobsters would contain about 17 lb. of phosphoric anhydride. In the analysis of the shell of a trilobite there appears to be a great excess of phosphoric acid, which Mr. Hudleston thought must be due to substitution.

NOTES AND QUERIES.

Cats and Water.—W. Sharp is not a solitary observer of the fact that cats will venture into water after fish. A few years ago I was walking by the side of a small river, when I noticed a cat crouching on the bank, and evidently watching something in the water; directly afterwards it darted in, and then returned to the bank with a small fish in its mouth, which it at once made a meal of. In opposition to the above, a cat which I have has a very great aversion to wetting either its mouth or paws, especially the former. I have often been amused when watching it eat bread and milk, for instead of taking a piece of bread out of the plate with its mouth, it generally jerks it out on to the floor with one or two hasty snatches of the paw, and then eats it; it also much dislikes being out in the rain, always getting under the nearest cover.—*James H. Allchin, Dover.*

Turntables.—I have been trying to improve my turntable, a plain one I bought of Mr. Baker, optician, of Holborn. I found the concentric guide circles on the brass were not easily seen, so I tried paper gummed on, and marked with ink circles; this did for a time, but used to come off. I also wanted some secure fastening for the slide, and found that Mathew's plan did not allow of finishing off any slide badly centred. I accomplished my wishes thus: I had a circle about one inch in diameter sunk in the face of the table, so that a round piece of thick paper or thin card, cut to fit it, could just lie in it: this can be marked in any colour or way wanted (it is but to have several different ones), and cannot easily be moved by the glass slip. I tried several plans of fixing the slide, but they were too complicated to please me, and would have been expensive; at last I hit upon the following, which I find answers. I cut a piece of wood thin enough to go under the springs, so as to fit between the screws, and present a standing edge to the glass slip; another thin piece serves as a wedge, and is so shaped that when a slide one inch wide rests against it, the edge is parallel to a line drawn through the screws, and it is properly centred. An eccentric button, with a large screw for its axis, enables the slide to be so firmly pressed against the wedge that no force likely to be used will move the slide. Of course brass would be better than wood, but I find wood do well for *a* and *w*. The button must be so placed that it will allow the slide to be wedged towards the button for about one-eighth of an inch. This will give ample play for a badly-centred slide. A wider wedge will be wanted for this, and if more play is wanted, the pieces *a* and *w* must be removed, and the old plan adopted. Of course the slide can be moved towards either end as required. The screw fastening the button should be large, as it keeps the button firmer. Mr. Baker, of Holborn, made me a button to my pattern, and could, I doubt not, alter any turn-table, or I would give him a pattern to do it by. I would suggest that a hollow should be cut out of the solid wood of the turntable to receive the pieces, and this could be closed by a slide. My turntable had no rest for the hand, and I have used a glass letter-weight, but a solid wooden rest would be better. Perhaps I may be allowed next month to describe a simple apparatus to help true centring in mounting, which I think an improvement on the block I recommended some months ago.—*W. Locock.*

Nests of Mice.—A correspondent in the April number of Science-Gossip gives us an account of the nest of the short-tailed field-mouse. I am glad of the opportunity of adding a word or two regarding the home of our common mouse. From the disagreeable odour pervading it, I discovered that a colony of mice had found out that good things were to be obtained from a large cupboard in my house. Here I left all the food for my poultry. A bag of wheat indicated that these "brownies" were enjoying themselves immensely. Having purchased some penny traps, I was successful in catching them all, or frightening some away. But on removing an inverted box, about one foot square, I was astonished to see a heap of what appeared to me to be very thin fibres, lying on the shelf. Such was the fact. A small basket was very neatly stripped round the lower part of its broader pieces of osier, and these had been torn into shreds varying from ¾ inch to 1 inch in length. All these little pieces (about a handful) had been made into a nest, and I was rather surprised to see that it was constructed just like a bird's nest, with the opening above. It was very loosely put together, but still compact enough to hold two little corpses, the parents having unfortunately met their fate by the enticing taste of roasted cheese.—*A. H.*

Cleaning Aquaria.—I have seen various modes of cleaning aquaria suggested, but know of none so efficient as the following. If your globe or tank is to go through a thorough cleaning, and has a coating of green or a growth of confervoid on the glass or slate, take a lump of salt and rub over the sides, and it will take off the growth of confervoid instantly, and will not injure or scratch the glass. The salt to be slightly wetted with water on its surface when rubbing the glass.—*A. J. R. Sclater, Teignmouth, Devon.*

To Clean Corals.—Have ready two large vessels that will take and cover the largest specimen of coral with water when filled, that you intend to clean. Keep one full of clean water, and have boiling water enough to fill the other. Now have ready a bottle of spirits of salts, muriatic acid. To every three gallons of boiling water use one pound of the acid. Your specimens of coral must be close to hand, so as to dip them in the boiling water and acid. The dirt will come off the coral instantly. Pass the specimens to a second person to wash them in the clean water, and then place them in the sun to dry. If very dirty, let them remain longer in the acid and boiling water. Dead shells can be made to look very nice served in the same way, and will retain a polish if not washed in the clean water. If the acid water should be too dirty, make some clean with a little more acid and boiling water. Dip in quickly, then place them out to dry. When dry, you will find a nice gloss on them, and you would think you were handling live shells instead of dead ones. —*A. J. R. Sclater, Teignmouth, Devon.*

White Varieties.—On reading "W.'s" remarks in your last number of Science-Gossip on white and other varieties of flowers, I thought I might supplement his observations by some notes of my own. I have seen *Cardamine pratensis*, var. *alba*, as near London as Wimbledon Common. *Campanula rotundifolia*, *alba*, has appeared occasionally on Clapham Common, and *Pedicularis sylvatica*, very pale, but not *quite* white, is often seen on Wandsworth Common. I have not yet seen a wild white *Colchicum*, but it may interest "W." to know that in Brewer's "Flora of Surrey," page 238, it is said to have grown on the Wray Park estate, and "the flowers vary in colour from white to purple." The cream-white, as well as the coloured varieties of *Symphytum officinale*, may be found in several places along the course of the Hampshire Avon. *Erica tetralix*, quite white, I found last autumn in little clumps (associated with

Lycopodium inundatum and *Narthecium ossifragum*), on swampy ground, near the Ringwood rifle-butts, in the New Forest. In some other specimens of this variety I noticed very dark, almost black anthers, so that looking into the flower, it appeared singularly beautiful by the contrast of its eight black dots (anthers) with the semi-transparent spotless corolla.—*Geo. Browner.*

Ancient Trees.—In the February number of Science-Gossip, page 46, there appeared a note, in which G. O. Howell states the Cypress of Somma, in Lombardy, to be the oldest tree on record, dating from the year 42 B.C. But at Anuradhapura, in Ceylon (noted for its ancient palaces), there is a Bo-tree—a very famous object in connection with Buddhism—which was planted 288 years B.C., and is by far the oldest tree in the world. It would have been blown down long ago but for a thick wall built round the trunk, and all its main branches are supported by pillars. The leaves that fall off are collected by the Buddhist priests every day, and are kept in a holy part of the temple. They are offered to their deity on festival occasions, also sold to the poor ignorant natives, who believe the money paid for these holy leaves will buy them the righteousness of saints. This tree is held in such reverence that it is often visited by numbers of pilgrims.—*A. F. Maingay.*

Birds and Severe Cold.—Several times during the late severe weather, I disturbed the sparrows sheltering for warmth close to the fireplace of our greenhouse. The other morning the gardener put out of its misery a poor little wretch all singed and burnt, with shrivelled claws, which he found fluttering under the fireplace on the hot cinders. The birds never sought the warmth of the fire in the hard weather before Christmas, nor at any other time to my knowledge. Is it that the cold weather coming so late, and after spring-like, open days, found the birds unfitted to withstand the unusual cold?—*H., Northampton.*

Moles.—The principal traps used in this neighbourhood for catching moles are made of iron with a steel spring, and cost, I believe, sixpence. It is a very simple contrivance, is easily set, and can scarcely be seen. A young fellow caught a great many on my uncle's estates last winter, and among them was a brown one with a light yellow breast—quite a curiosity. I always thought moles were shy, timid animals until last winter. I was out with a couple of young spaniels, when they caught something, and kept tossing it in the air and yelling. Wondering what the deuce was up, I went to them, and found they had caught a mole, but the vicious little animal, instead of yielding quietly, turned on the dogs, and bit them severely about the lips, just like a rat. On examination, I found the mole had a set of splendid teeth, finer than a ferret's—in fact, as small and sharp as needles.—*Arthur Smyth, Parracombe.*

Hen and Snake.—A few days since, at Park Homer, near Wimborne, the attention of the poultry-woman was called to the fact that a hen turkey, which had been sitting, was off her nest. On closer examination, it was found that she was engaged in a struggle with a snake, which had coiled itself round her neck, but whose body she held tight in her bill, not far from its head, which she beat against the ground till she had destroyed it. I saw the reptile afterwards hanging on a tree, and though I did not examine it very closely, I am inclined to think, from its colour, that it was a viper, and not an innocuous snake.—*C. W. Bingham.*

The Upas-tree.—The tales about the Upas of Java are said to have arisen from the reports circulated by a Dutch surgeon of the name of Foersch, who gave out the most exaggerated accounts of the virulence of this tree; but modern botanists and travellers have ascertained that it is comparatively harmless. It is grown in botanical gardens along with other plants, and known to thrive in woods where there are various kinds of trees. Birds and lizards too are occasionally seen on its branches, so the Dutchman's yarns are proved to have been untrue; but as it grows on certain low ground in the valleys in Java,—valleys fatal to animal life from the amount of carbonic acid gas which escapes from crevices in the ground,—this tree has had to bear the blame of the evil really done by the sulphurous vapour; still there is no doubt but what the juice of the Upas does contain an acrid poison called *antiarin*, which the natives dry and mix with other ingredients for the purpose of poisoning their arrows with.—*H. E. W.*

Goldfish-Breeding.—I should be glad of any information respecting goldfish-culture. What temperature should the water be for hatching the spawn? Also, should the spawn be scattered about, or left all together after it is taken from the fish? Is there any book published on this subject? If so, where could I obtain it?—*W. Elliott.*

Proliferous Daisy.—In Science-Gossip for 1865 there is an engraving of a proliferous form of the common daisy found by a correspondent at Bute. A few days ago I met with a similar specimen to that figured, but with *twenty* miniature daisies instead of ten. The peduncles in my specimen are much shorter than shown in your engraving. It was found near this place, with other common daisies from same root.—*W. Macmillan, Castle Cary.*

Ivy-berries and Birds.—For some weeks past we have observed, scattered over the grass, a number of small, half convex, half angular bodies about one-fifth of an inch long, some white, some bright pink, the nature of which has puzzled the learned. We observed them last spring also. One naturalist to whom they were shown pronounced them to be the eggs of a blatta. At last a very youthful observer, playing with some ivy-berries, noticed that the aforesaid bodies seemed identical with the seeds inside these berries. So it proved. The seeds are often found cemented four or five together in the droppings of birds, who, in this case, have perhaps taken more than was good for them. He also found a great many in a blackbird's nest. One can hardly believe they would be suitable food for the young birds; and yet it is difficult to see for what other purpose they could have been brought there.—*T.*

White Flowers.—Having been much interested in "W.'s" paper "On White and other Varieties of Flowers," I venture to send a list of those which, owing probably to the chalky nature of much of the soil, I find *pure white* in this locality. In our own meadows and lanes, *Agraphis nutans*, *Cardamine pratensis*, *Orchis Morio*, *Ajuga reptans*, *Prunella vulgaris*, *Bartsia Odontites*, *Viola odorata*, and rarely *Primula vulgaris*. The latter also occurs of a pale green, dull pink, and very beautiful orange colour. On the South Downs *Gentiana amarella* and *campestris*. *Polygala vulgaris* abounds on the Downs, with the base of the corolla tinted as described by "W.," but in our damp woods and meadows the only colour I can find on many white specimens is a green line or two on the wings. On Ashdown Forest I have gathered *Erica cinerea* and *tetralix*; also *Calluna vulgaris* of a most pure and beautiful white.—*M. C. Allen, Barcombe, Sussex.*

The New Zealand Forests.—"A. B., Kelso," writes without practical knowledge of the peculiarities of the flora of the New Zealand forests, and the reasons he assigns for the difficulties met in propagating most of the different species, not being supported by facts or the results of experiments, afford no enlightenment on the subject. The Canterbury plains contain all sorts and varieties of soil pretty well, yet, though the Tasmanian Eucalyptus, some American trees, and all the English fruit and forest trees thrive luxuriantly on these plains, the cultivation of the indigenous trees has never yet met with success. The seedlings spring up under the shade of the parent trees in abundance, but if transplanted die. If the seeds be gathered and sown, some portion occasionally vegetates, but the plants soon die or become sickly and stunted. This is rather an unfortunate circumstance, as some of the native timber is really very useful, and some of the trees, such as the Totara, would be very ornamental if they could be induced to grow about the homesteads on the plains. I hope some New Zealand botanist will favour your readers with his views and experience in the matter. —*A. D. Bocking.*

Cat Suckling Squirrels.—A few weeks ago I found a couple of young squirrels (*S. vulgaris*), about a day or two old. Wishing to keep them, I looked for some animal to suckle them. Luckily a cat (a young one, and perhaps, therefore, rather inexperienced) had kittened a day before, and I therefore killed two of the kittens, and gave puss the squirrels instead. She did not seem to mind the change, and is suckling the two squirrels with the remainder of her own offspring. They are thriving very well, and to all appearance are as healthy as if they had enjoyed the care of their own mother.—*E. A.*

Goole Scientific Society.—At a meeting held in Goole on May 5th it was decided that a society should be formed in that town for the cultivation of science, to be called the Goole Scientific Society. The meetings are to be held monthly, and during the summer to take the form of excursions to places of interest. M. A. Morris, Esq., was elected president, and Dr. Parsons secretary.

Mountain Linnet.—I found the nest of the Mountain Linnet (*Linota montium*) in the low land about the river Trent this year. It was built on the ground among young nettles; the outside was made of hay, the inside was lined with horsehair and wool. The eggs, six in number, are white dashed with green, spotted with red and brown. I see in books on ornithology it is seldom found so far south. Can any of your readers let me know if it has been found in the Trent basin before?—*Lucie Woodruffe.*

Keeping Parrots.—"J. J. M." did not, I am afraid, feed his parrot in a proper manner. Parrots should be given a great variety of food. Indian corn should form their staple article of diet, but they ought to be supplied with ripe fruit of various kinds, such as apples, oranges, nuts, &c. &c. Hemp and canary-seed may be given; and milk-and-bread most parrots are very fond of. The bread must be scalded before the milk is added to it. They should be well supplied with fresh water, and during the summer green food may be given. Clean tins are very essential, for if the food or water is given in tins in which there are any remains of food, the result is almost sure to be illness of the bird, and perhaps death. The parrots I have drink tea, coffee, and milk, and sometimes they are allowed a bare bone to amuse themselves with. They are in excellent condition. I believe one of the secrets of keeping parrots in excellent health and plumage is to allow them liberty, for most of the cages in which they are confined are far too small. Let them come out of the cages and run or walk about; for, if always kept in, diseases of the feet may be contracted. Diarrhœa, one of the scourges of the parrot tribe, is easier to prevent than to cure. If a bird is afflicted with it, the diet ought to be immediately changed. Hard-boiled egg and Indian corn should be given, and the bird placed in a warm room.—*J. T. T. R.*

A Canine Oddity.—A friend of mine a few months ago bought a black retriever from the Dogs' Home, which at present has got the distemper, and one of its eyes has turned a bright blue colour, while the other is a blackish-brown; he, thinking the dog was getting blind, took it to a man professing to be a great dog doctor, who informed him that, as soon as it got over the malady from which it was suffering, its eye would most likely return to its original colour. I have no doubt that the majority of dogs that are occasionally met with, having differently coloured eyes, have been severely attacked when young by the distemper or some analogous complaint.—*C. P. Hall.*

Do Fishes utter Sounds?—Having seen the above subject brought up in the "Notes and Queries" of Science-Gossip, I venture to state an instance that came under my father's notice whilst travelling in the interior of the island of Ceylon, in company with a few other gentlemen, when crossing a large lake in a canoe. As they proceeded, they suddenly heard a peculiar singing sound in the distance, which by degrees arose from all parts of the lake; the only sound that they could compare it to, was a great number of Æolian harps heard from a distance. The natives who were in the canoe at the time informed them that it was caused by a species of fish, which they designated by the name of "singing fish," and that it was not a very uncommon occurrence to hear them on fine nights. At first they did not credit the information of the natives—true, but after listening intently for some time, they satisfactorily found out that the sound certainly did come from some inhabitant of the water.—*C. P. Hall.*

Gooseberry Caterpillar.—The assumption of superior knowledge by Castle Barnes (p. 91) is rather amusing. His entomological observations would appear to have been rather limited if he has hitherto only found the larva of *Halia wavaria* common on gooseberry-trees. "A. N." (p. 46) is very ready to hastily contradict Mrs. Watney. That lady was perfectly correct in her statement, as regards the larva of *Abraxas grossulariata*, or currant-moth, as every entomologist knows. The distinction between it and the larva of *Nematus* *ventricosus*, one of the saw-flies, is clearly defined by "G. P. H." (p. 93). It would be much better if would-be correctors would study the *pros.* and *cons.* of a subject a little more before hastily contradicting the statements of others. I have been a subscriber to this journal from its commencement, and have several times observed with pain a want of common courtesy in replies to some of Mrs. Watney's communications. A lady at least is entitled to courtesy; and especially so, from correspondents of GOSSIP, is a lady who has so often contributed to our information in its pages.—*E. B. Kemp-Welch.*

TYRIAN PURPLE.—The molluscs which form the subject of this note belong to the families *Muricidæ* and *Buccinidæ*. According to Gosse, the principal fish from which the dye (perhaps the most celebrated product of Tyre) was extracted was the *Murex trunculus;* and the same writer, in another place, remarks that Mr. Wylde, who visited the ruins of Tyre in 1838, found on the shore a number of round holes cut in the rock, varying in size from that of an ordinary metal pot to that of a large boiler. In these cavities, and scattered on the beach around, lay large quantities of shells, broken apparently by design, but subsequently agglutinated together. The broken shells proved on examination to be those of the *Murex trunculus.* The Tyrians used to extract the dye, which was a white clammy liquid, from a small reservoir situated in the throat of the mollusc, and as the quantity seldom exceeded two drops, the number killed must have been very great. After the dye was extracted, it was mixed with salt to prevent decomposition; then it was diluted with six times its weight in water, and kept in tin vessels moderately hot for ten days, during which time the liquid was frequently skimmed to prevent impurities remaining. After this the material to be dyed was immersed in the liquid for five hours; then it was taken out and dried, and in this state was ready for use. Only woollen fabrics could be coloured successfully with this preparation; and articles thus coloured had an extremely unpleasant smell. Pliny informs us that the Tyrians first dyed their wool in the liquid of the *Purpura*, and afterwards in that of a species of *Buccinum*. Plutarch also mentions another mode of preserving the dye by combing the coloured wool with honey, and tells us that the purple of Hermione, which was thus prepared, after it had been laid up for 190 years, retained its freshness and beauty. In later times the art was practised only by a few persons, kept by the emperors for that purpose, and shortly afterwards it became quite lost. In the year 1683, Mr. Cole, of Bristol, procured a white liquid from the head of a mollusc he calls the *Buccinum Lapillus* (now called *Purpura Lapillus*), with which he stained linen. When the stain was exposed to the light, the linen first became green, then blue, and ultimately a purple red. (*Phil. Trans.* abridged, vol. ii. page 823.) Réaumur regarded the modern purple fish as a species of *Buccinum*, and he adds that there are several kinds differing in magnitude and form. The ordinary name of the fish is the Dog-winkle.—*E. H. G. and W. J. S. S.*

CATS AND MUSIC.—Some time since I had an ordinary tortoiseshell cat, which had a peculiar fondness for the tune known as "Rode's Air." One day I chanced to whistle it, when, without any previous training, she jumped on my shoulder, and showed unmistakable signs of pleasure, by rubbing her head against mine, and trying to get as near my mouth as possible. I have tried many other tunes, but with no avail.—*Musicus, Padiham.*

LONDON FIELD NATURALISTS' SOCIETIES.—Having just come to live in the East centre of London, I should be glad if any of the numerous readers of S.-G. could inform me of any Field Natural History Club that I could join, taking especial interest in Entomology and Botany.—*M. J. Anderson.*

AUSTRALIAN INSECTS.—I have been collecting insects for the last few years, and have, I think, about 500 specimens, but am in great difficulty as to naming them. They are all collected within a few miles of Melbourne, therefore Victorian. I should be very much obliged if you could inform me, by means of your Journal, of some book (illustrated, if possible, as I have no idea of the names, though I can classify them in their different orders) by which I could name them—and price of it.—*Francis G. A. Barnard.*

SEASIDE SHRUBS.—At page 95 of SCIENCE-GOSSIP, a nameless correspondent mentions among seaside shrubs "an evergreen with small oval leaves, bright and shiny," which he thinks to be a kind of bay-tree, but does not know its name. The shrub referred to is evidently the *Euonymus*, which flourishes in the immediate neighbourhood of the sea, and, I believe, does not do well inland. Here, in the Isle of Wight, it is abundant in gardens close to the shore, and also some distance away from it. It is a very useful shrub, growing to a considerable size (I have one over eight feet high), can be cut to any form, or trained against a wall. The young leaves in the spring have a fine golden-yellow colour; and I have often noticed strangers stop to admire them. Besides those that have the leaves concolorous, there are varieties in which the margins of the leaves are yellow and white, known as Gold Edge and Silver Edge.—*G. Guyon, Ventnor, I. W.*

THE COLORADO BEETLE.—Though the alarm about the Colorado beetle appears to be rather subsiding, yet as it is important that the insect, if it did occur, should be detected at once, and few persons in this country would know it, it might be worth suggesting that some American correspondents could easily send over a bottleful or two, which might be distributed through the Entomological Society or otherwise. Most English towns boast of a resident Entomologist, who might keep a specimen for comparison. Early detection of the interesting stranger might enable the source of introduction to be traced, and further immigration arrested.—*G. Guyon, Ventnor, Isle of Wight.*

WHITE VARIETIES, &c.—May I add to the list of "White and other varieties of flowers" already mentioned by some of your correspondents the *Lychnis Flos-cuculi* (Ragged Robin), which I have found of a pure white, almost more beautiful than in its natural red or rose, also a pink variety of *Veronica chamædrys* (Blue Speedwell), which, for two or three consecutive years I found in the same spot, and the *Scilla verna* (Spring Squill), which I found in the Isle of Man? This grew in great profusion in various parts of the island; but on the hill overlooking Peel Castle, among the stunted grass, were many specimens of white and pink, while those of the ordinary pale blue were of a deeper tint than usual. These specimens were very small, many of them less than one inch in length, including bulbs, leaves, and blossoms. They were the most exquisite little bulbs I ever remember to have seen. Should any of your readers be visiting that locality this ensuing month, it would be worth their while to see whether any of these varieties are still to be found there. The hill to which I allude is that from which the castle was battered. I will take this opportunity of mentioning that on the 23rd of November last I saw a Glastonbury thorn that was quite patchy with white blossoms. It had buds, leaves, blossoms, and ripe berries, all at the same time. I saw it again on the 15th of April. It had three or four stray blossoms, but nothing like what it had in November; and on the 11th of this month (May), it was nearly as thickly covered with blossom as any ordinary thorn bush, but it did not look healthy.—*H. M. M., Weston super-Mare.*

Natural History in Novels.—The following is taken from the new novel "Katerfelte" (page 104). Is it in accordance with the observations of any of your readers? "Do you remember, brother, how one night in the apple-water country, on the banks of the Wye, we took a rooster off his perch, and brought the poor dwrd chiriclo [bird] into our empty barn by the light of a single lantern? How Mother Stanley bade us lay the fowl's bill against the bare boards, and draw from it a line of white chalk to the far edge of the threshing-floor, and how the helpless creature believed itself tied?" —R. S. T., *Surrey.*

The Gooseberry Caterpillar.—The gooseberry caterpillar is the larva of a saw-fly (*Nematus ventricosus*). These pests are little greenish caterpillars, spotted with black, and feed in thousands on the leaves from May till September. They form clusters of little black cocoons between the leaves, and the flies have dull orange-coloured bodies and black thoraces. Hand-picking is the best, and I believe the only remedy for their extirpation.—*W. H. Warner, Standlake.*

Viper's Bite.—A boy in Oxfordshire was once bitten by a viper. The doctor, on being called in, gave directions that the reptile should be searched for, killed, and its fat applied as a curative, which was accordingly done, and the patient recovered. Is this a common remedy?—*W. H. Warner, Standlake.* [It is a very old tradition, at any rate.—Ed. *S. G.*]

Brown Rat.—A rat was observed in a neighbour's yard, a few weeks back, dragging along the body of a dead comrade.—*W. H. Warner.*

Gray's Banded Newt (*O. vittatus*).—Has this rare species of newt been lately observed in any part of the United Kingdom? I should be glad of any information respecting it other than what has been published in Mr. M. C. Cooke's work on reptiles.—*W. H. Warner, Standlake, Witney, Oxon.*

Horse-chestnut Trees.—Along the side of the road between Woolwich and Charltou there is a row of horse-chestnuts: three of these trees invariably come into leaf every year long before the others. Can any correspondent explain the reason? They are situated in an open meadow, therefore one has no more protection than another.—*W. L. H.*

Local Names.—I am anxious to obtain the local names of plants in my locality. How am I to set about it? I have no time except before 8 a.m., and know no country men. I also want to know any local superstitions or uses for plants. If any one would send me any such I should feel greatly obliged.—*W. G. Piper, care of F. Sutton & Co., Bank Plain, Norwich.*

Etymologies.—Can any one help me with the Etymologies of the following names? I believe no name was ever given without a reason, and I want to get hold of the reasons. The following is only a partial list: *Frankenia; Githago; Dianthus*, from *Dios anthos*, but why? "Deptford Pink," why so called? *Sagina; Illecebrum; Knawel; Elatine; Hypericum.*—*W. G. P.*

Epiphytes.—Has the ash of Epiphytes ever been analyzed, or have they none? If they have an ash, where do they get it? If they have none, the presence of ash in land plants must be accidental, not essential. By Epiphytes I mean plants which depend on other plants for mechanical support, but which draw no nourishment from their supports, but only from the air.

Empetrum.—Has the epidermis of the lower (or inner) surface of the leaf of *Empetrum* ever been examined microscopically for stomata? If there are any there, what is the use of them, as they are quite enclosed, and shut away from the external air? (Hooper). Will any one kindly send me a small living plant for microscopical purposes, as it does not grow anywhere near here?—*W. G. Piper, care of F. Sutton, Bank Plain, Norwich.*

Aspen.—In a Russian Folk-tale I find an aspen stake is driven into the dead body of a witch, and in another tale an aspen club is used to beat a witch-horse to death. Is there any superstition which would account for this, as these tales are not generally so particular without cause?

Ants.—Some time ago, wishing to rear some wasps, I with difficulty succeeded in capturing a nest. In some of the cells there were little wasps, in others honey; most were covered with a stiffish white cap. One by one the wasps left their cells, and began feasting on the honey. Going one day to the box where I kept them, I found it literally filled with ants; common black ones. They were devouring eagerly, not only the honey, but the wasps also. A day or two later, on visiting my colony, I found ants lying dead all over the box; only a few live ones were left. On my next visit the dead were in orderly piles, as if the remaining ones had swept them into little heaps, while a day or so later they had all disappeared, with the exception of a few live ones. In the first place how did the ants discover the wasps, which were in a window-seat in the second story? Did they smell them? And secondly, how did they first sweep up and then carry off their dead companions? If any reader of Science-Gossip can answer these questions, I shall be glad to have him do so.—*Amy C. Pearson, Plainfield, N.J., U.S.A.*

Adders Swimming.—Adders have frequently been observed swimming in Loch Doon, Kirkcudbrightshire, some of them having been thrown in, others having entered the water of their own accord, evidently with the purpose of swimming to the other side of the loch, a distance of about a quarter of a mile. When observed they were moving along rapidly, with their heads raised about three or four inches above the surface of the water.—*F. J. Allan.*

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.

John Smith (York).—No. 1, *Donacia sericea*, L. (the same as *Proteus*, Stephens); No. 2, *Donacia simplex*, F.; No. 3, *Amara trivialis*, Gyll.; No. 4, *Amara plebeia*, Gyll.; No. 5, *Pterostichus strenuus*, Panz.; No. 6, *Pterostichus vernalis*, Gyll. *Chrysomela fulgida*, Stephens, is the same species as *C. graminis*, Linnæus, which, of course, is much the older name of the two, and should be used.

J. B. (Bracken Hill).—The beetle is *Niptus hololeucus*, one of the Ptinidæ, now a very common domestic insect in this country. For an account of its swarming, see "The Entomologist's Monthly Magazine," vol. ix. p. 119.

W. Richer (Norwich).—No. 1, *Bembidium littorale*, Oliv.; No. 2, *Pterostichus minor*, Sahlb.; No. 3, *Calathus cisteloides*, Panz., male, immature; No. 4, *Calathus cisteloides*, female; No. 5, *Bembidium lampros*, Hbst.

Rose Morton (Ripon).—Nos. 1 and 10, *Neckera complanata*; 2, *Hypnum molluscum*; 3, too imperfect for determination; 4, *Hypnum fluitans*; 5, *H. resupinatum*; 6, *Rhynchostegium ruscifolium*; 7, *Dicranum cerviculatum*; 8, *Tortula muralis*; 9, *Anacalypta Stackeana*; 10, see No. 1; 11, *Gymnostomum microstomum*.—H.

H. J. (Invergordon).—No specimens enclosed.

T. B. (Halstead).—No. 1, *Weissia cirrhata*; 2, *W. mucronata*.—H.

J. C. D. (Ripley).—Your moss (No. 2) is *Bryum cæspiticum*, mixed with *Hypnum plumosum*. No. 1, the flowering plant, is *Prunella vulgaris*.

F. S. Sheldon.—Write to the Rev. Thomas Wiltshire, Secretary of Ray Society, 25, Granville Park, Lewisham, S.E.

F. H. Arnold and Others.—Science-Gossip will be carried on as usual under the same editorial direction as formerly. Please address "Editor of Science-Gossip."

T. Howse.—The "Exchange" was in reality an advertisement, and as such is excluded from *gratuitous* insertion.

W. Thomas.—Only one specimen of plant reached us, a pink flower called Lousewort (*Pedicularis sylvatica*).

M. D. Beresford.—Your slides will be returned shortly. It is impossible for us to attempt to name plants from a microscopical examination of their pollen-grains, especially foreign plants. No botanist would risk his reputation in attempting such a thing.

Agnes C.—No specimen of Geranium was enclosed in your note.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Ova of *Cerura vinula*, mounted, for any other Slide of Insect Ova or Mites.—Ed. Lovett, Holly Mount, Croydon.

For cuticle of *Convallaria* send a stamped directed envelope to W. H. Gomm, Somerton, Taunton.

For living specimens of *Planorbis*, *Lymnæus*, and *Paludina*, send small box and postage and any object of interest to Mrs. S., 34, Manchester-street, Notting-hill, W.

Carpenter's "Vegetable Physiology" for British Birds' Eggs, or Offers.—H. Wiglesworth, 1, Lewisham-terrace, Lewisham.

Leaf of *Ficus elastica* (discoloured), and many others, well mounted, for good Slides. Send list. Wanted also Insects' Eggs, unmounted.—C. C. Underwood, The Laurels, Winchmore-hill, N.

W. G. Piper wishes to exchange Fruits, Seeds, and other vegetable products used in the manufactures or otherwise interesting.—Bank Plain, Norwich.

French, Italian, and South African Algæ wanted in exchange for North and South Devon and Cornish Seaweeds, of which many are scarce.—H. Goode, 13, Clarence-street, Penzance.

Wanted to take in exchange or buy, a few rare British Univalves and Nudibranchs, shell and animal. Lists exchanged.—J. Turner, Davenport, Stockport.

Draba aizoides, in exchange for other rare Plants.—H. Jones, 26, Victoria-street, Shrewsbury.

Wanted, in exchange for N. A. Land, Fresh-water, and Marine Shells, and Lower Silurian Fossils, Land, Freshwater, and Marine Shells of England and the Continent, and especially those of Australia and New Zealand.—A. G. Wetherby, Woodburn, Cincinnati, Ohio, U. S. A.

Wanted, 26, 45, 67, 1039, 1109, 1229, 1512; offered, 33, 141, 195, 1041, 1093, 1235, 1506, London Cat., 7th ed.—Rev. F. H. Arnold, Fishbourne, Chichester.

Send Mounted Slide for fresh-collected Cluster-cups on *R. ficaria*, *Æc. rubellum*, and *Æc. urticæ*, all unmounted.—G. Garrett, Harland House, Wherstead-road, Ipswich.

British Plants.—Wanted, *Frankenia*, *Elatine*, *Thesium*, *Hippophæ*, *Eriocaulon*, and *Pilularia*; offered, *Anemone apennina*, *Pulmonaria officinalis*, *Asarum europæum*, *Muscari racemosum*, *Aristolochia clematitis*, *Petasites fragrans*, or others.—G. B., 143, New Bond-street.

Sphingidæ wanted, from the West Indies or Central America, in exchange for those of the United States, or will purchase.—Geo. W. Peck, 228, Pearl-street, New York.

Ammonites vertebratis, from Oxford clay, and *Terebratula maxillata*, &c., from oolite, for any Common Fossils from any other formation.—J. Windoes, Chipping Norton, Oxon.

Twelve rare specimens of polished Madrepores, named; twelve rare specimens of British Shells, named; twelve rare specimens of Starfishes, named; twelve rare specimens of laid Seaweeds, named; twelve rare specimens of Devonian Fossils, named; twelve rare specimens of Devonian Minerals, named (and to any number, if required); for Silurian Trilobites and Devonian do.—A. J. R. S., 9, Bank-street, Teignmouth, Devon.

Duplicates.—A few *Argiolus*, *Jacobææ*, and *Alveolus*: also rare botanical specimens. Desiderata: Entomological specimens or birds' eggs.

Intestine, Human, *Jejunum opaque*, for Binocular. And Section of Human Lung, transparent, for two good Slides of Diatoms.—Jas. Logie, St. Cyrus, Montrose, N.B.

Conchology.—Offered, Specimens of *Zonites excavatus* and var. *vitrina*, *Zonites glaber*, *Helix rotundata*, var. *alba*, *Helix Cartusiana*, *Cochlicopa tridens*, var. *crystallina*, &c., for *Limnæa involuta*, *Succinea oblonga*, *Acme lineata*, or other equally rare shells.—Lister Peace, Hebble-terrace, Bradford-road, Huddersfield, Yorkshire.

BOOKS, &c. RECEIVED.

"The Chemistry of Light and Photography." By Dr. Vogel. London: H. S. King & Co.

"Memoir of Sir Roderick Murchison." Two vols. By Professor Geikie. London: John Murray.

"Canadian Entomologist."

"The Colonies."

"Land and Water."

"Ben Brierley's Journal."

Reports and Journals of various Natural History Societies.

"A Manual of Bee-keeping." By J. Hunter. London: Hardwicke.

Communications Received up to 12th ult. from:—S. A. F.—F. K.—G. H. K.—W. W.—F. J. A.—H. M. J. U.—A. C. P.—I. F. P.—C. C. U.—W. G. P.—E. H.—J. H.—S. H.—H. E. W.—H. G.—W. E.—C. W. B.—F. J. A.—J. H. P.—J. T.—E. L. M.—T. H.—G. W. P.—W. H. B.—H. J.—J. W.—M. R. F. H. A.—A. G. W.—J. G. H.—E. C. R.—W. R. H.—E. L.—G. B.—A. J. R. S.—T. R. Y.—G. S. S.—M. J. A.—E. A.—H. M. C. A.—H. T. P.—R. W.—W. H. G.—W. M.—L. W.—M. S.—E. L.—W. H. G.—J. W.—G. G.—G. A.—T. G.—H. J. M.—T. S. S.—G. O. D.—J. M.—F. K.—H. P. M.—W. T.—Dr. J. J. G.—W. A. T.—W. L. H.—R. C.—J. R.—F. G. A. B.—G. H. H.—R. S. T.—A. C.—L. P.—Mrs. R.—W. E.—J. L.—W. R. B.—W. G. P.—M. P. M.—G. G.—H. M. M., &c., &c.

BRITISH LAMINARIEÆ—A SUGGESTION.

BY MRS. MERRIFIELD, BRIGHTON.

THE season for collecting seaweeds having commenced, I venture to direct the attention of algologists to the Laminarieæ, some species of which, new to this country, may possibly be found on our coasts.

Besides the well-known native species, the stems of *Laminaria longicrucis*, a species common on the Greenland and North American coasts, are sometimes cast ashore on the north-western coasts of these islands as well as on those of Jutland and Sweden, and occasionally fronds of a very large Laminaria are found on the shores of Scotland. Professor Agardh, the celebrated Swedish algologist, thinks that the last-mentioned plant may be the gigantic *L. caperata*,* a native of the seas around Spitzbergen. I possess a fragment, given to me by the late Mrs. Gatty, which is 18 inches in breadth. I have also a young frond of Alaria from Bamborough, which Prof. Agardh says looks like *A. Pylaii*, which inhabits the coasts of Greenland, Newfoundland, and Iceland. The Professor has also specimens of *A. musæfolia* (formerly considered as a variety of *A. esculenta*) from Britain and France. These instances are certainly indications that some at least of the above-mentioned, and even of other species of the Laminarian family, may be found on our coasts, and I would suggest to algologists that their search for them may be rewarded by success.

The genus LAMINARIA is extensive. In his "Species, Genera, et Ordines Algarum," Agardh describes seventeen species; and in a recent Essay on the Laminarieæ and Fucaceæ of Greenland, he describes several new species. Harvey, also, in the "Nereis-boreale Americana," suggests that, of the numerous specimens of Laminaria which he found on the American coasts, several might possibly constitute distinct species. Of the genus ALARIA, Agardh enumerates five species from Greenland and Spitzbergen; and of these it seems not improbable that three species may be found on the northern and Atlantic shores of these islands, and on the north-west of France.

But there is much difficulty in identifying species which bear so great a resemblance to each other. I would therefore suggest that, when individuals are met with which appear to belong to other than our native species, they should be submitted, for determination, to competent authority.

In the meantime I beg to offer a few remarks on the points to which collectors should direct their attention.

As no algologist will venture to determine a species from the inspection of a single example, unless of very strongly-marked forms, it will be necessary to collect several specimens—fruitful ones especially—of the same plant for examination. These specimens should be of all ages, so as to make a complete series.

I cannot do better here than quote a passage from Prof. Agardh's Essay, to which I have before referred:—

"The difficulty of characterizing the Laminarieæ is actually very great, not only on account of the great resemblance between them, but also because the species change their aspect during different periods of their development, and this occurs most

* *L. caperata* was formerly considered a variety of *L. saccharina*.

frequently in an analogous manner. All agree that during the first period they are so like each other, that it is almost impossible to separate one from another of the younger forms of the most dissimilar species. There is no doubt whatever that they all begin with a short stalk and an undivided lamina; that this stalk continues always short in some, and lengthens very considerably in others; and that the lamina in some remains undivided, but in others is laciniate. But it is especially to be observed that this lamina—whether it be undivided or laciniate—is variable in most species. Thus all are at first small and extended in length, with a more or less wedge-shaped base; but the wedge-shaped base becomes heart-shaped, and even kidney-shaped in some; in others it retains its wedge-shaped form throughout the whole state of development. It is known that most, at least, of the species periodically change their lamina; and the new lamina becomes larger and broader than the old one. The young lamina is thin, in colour rather inclining to green than to light brown; in different species the lamina is at a later period thinner or thicker, and with a different tint of colour. The fructification appears in different species, not only in different parts of the lamina, but the sori extend in different directions, although they do not seem to assume precise forms."

Suites of specimens of Alaria, at all periods of growth, should be collected, and especially with fructification, and the differences of form observed. In some species the lamina is linear; in others shorter and more oblong or oval; in others much extended and strictly linear. There are differences, also, in the relative breadth and length of the lamina; some are wider than others in proportion to their length; one, for instance, in the Sea of Okhotsh is recorded as 50 feet in length and from 2 to 4 inches in breadth; while a gigantic specimen from Spitzbergen is 1 foot 6 inches broad and 6 feet long. In some the base of the lamina is cuneate and decurrent; in others ovate; in others, again, cordate. The stem, which is short in young plants, lengthens with age. It varies, however, in length, in several species from 1 to 2 inches, in some to 4 feet, and more in others, and is covered with the remains of the pinnæ of several years' growth. The pinnæ vary in form and size in different species. Differences also occur in the thickness or thinness of the lamina and likewise in the costa, which is more elevated in some species than in others. Hence the necessity of accurate observation and comparison of many examples before the species can be determined.

I must now refer to the mode of preservation. Prof. Agardh states that the best way of preserving algæ is to salt them down in a cask or tub. First put into the cask a layer of salt, then a layer of algæ, then salt, then algæ, and so on, until the vessel is full. The algæ should not be previously washed in fresh water, as the salt assists in preserving their suppleness. The algæ brought home by the Swedish Expedition from Greenland and Spitzbergen in the year 1870, and which afterwards formed the subject of Agardh's Essay, were preserved in this way; and the Professor states that, when opened, they were found to be almost as fresh as when first taken out of the sea, and in an admirable condition for examination.

MANNA OF THE DESERT (*Lecanora* or *Lichen esculenta*, and *L. affinis*).

In the supplement to the new edition of the "Treasury of Botany," under the head of "Manna," it is stated that "*Lecanora esculenta* and *L. affinis* are called 'Manna' in Armenia and Algeria, and are eaten in times of scarcity"; the writer might have added, "a vegetable substance supposed to be the manna on which the children of Israel were fed."

As some may not have read the articles on this subject in Science-Gossip for March, 1872, p. 60, and August, 1872, p. 186, and one on the same subject by Lindley in his "Vegetable Kingdom," it may be as well to draw attention to them, and at the same time to add a few further remarks on the subject. It is probable that there may have been some hesitation by the writer in the Supplement, in consequence of the conclusion arrived at in the "Dictionary of the Bible," published by Murray in 1863, viz., that because the shrubs producing the common manna of the shops, and the natural products of the Arabian deserts and other Oriental regions, which bear the name of manna, give a supply only three or four months in the year, and have not the qualities ascribed to the manna of Scripture, and for other reasons equally inapplicable, therefore the manna of Scripture was wholly miraculous. It should be borne in mind, however, that the lichen (or *Lecanora esculenta* and *L. affinis*) may be gathered during *the whole year*, and, as Lindley says, "appear suddenly in immense quantities in Persia, Armenia, and Tartary, where they are eagerly devoured by the natives, who fancy they must *fall from heaven*, not knowing how else to account for the prodigious numbers of these plants, of the origin of which they are ignorant"; adding, "Parrot says that in some districts they cover the ground to the depth of five or six inches." There is no reason, therefore, to suppose that the manna, though *miraculously sent*, was not a natural product, any more than the water from the rock of Horeb, or the quails, which, though natural themselves, were miraculously sent.

The apparent difficulty arising from the fact that the manna collected on the sixth day "did not stink" on the Sabbath, although it did so on the other days if kept over the day, is removed by the direction of Exodus xvi. 23, "Bake that which ye will bake to-day, and *seethe* that ye will seethe"; in other words, by *scalding*, clearly directing and showing how decomposition was to be avoided, adding, "that which remaineth over lay up for you to be kept until the morning." It is probable that the lichen with which the Israelites were fed was the *affinis*, which is so closely allied to the *esculenta*, that Lindley treats them as almost the same, and as traversing the same regions. There may, however, be a slight difference in the taste and colour between the plants of the East and the plants of Algiers, which Lindley calls a "species or variety"; indeed the Mosaic account itself varies as to the taste, for in Exodus xvi. 31 it is said to be "like wafers made with *honey*," whereas in Numbers xi. 8 it is said that "the taste of it was as the taste of *fresh oil*."

The enormous additional quantity requisite for the subsistence of the Israelites, as stated on calculation, in the "Dictionary of the Bible" (viz. 15,000,000 lb. a week), might of course be raised as far as necessary, by Divine agency increasing the *growth* of the plant without depriving it of its character as a *natural* product.

I have conversed with several clerical friends who have read the above-mentioned articles, and who are satisfied with the proofs adduced; indeed, they first drew my attention to Exodus xvi. 23, as to the preservation of the manna over the sixth day by scalding.

Lindley gives illustrations, in his "Vegetable Kingdom," of the two Eastern plants, *L. esculenta* and *L. affinis*. The *L. esculenta* of Algiers, which Lindley calls a species or variety, is illustrated in SCIENCE-GOSSIP for March, 1872.

Brighton. T. B. W.

NOTES ON THE DIPTERA.

(*Continued*).

JUNE TO AUGUST:—GAD-FLIES.

AMONG the many flies which haunt the banks of streams and ponds, fields where cattle are grazing, woods, and similar places, there are none more likely to attract attention than the Tabanidæ—Gad-flies, Breeze-flies, or Brown-stouts, as they are sometimes called. They are well known to farmers, and indeed most people who frequent the country are more or less acquainted with them.

Their general shape, when viewed from above, is somewhat oval. The head is wider than the shoulders or prothorax, but not so wide as the middle portions of the insect. Their eyes are generally brilliantly coloured, and possess a metallic lustre. They are moderately strong insects, but their bodies are soft, not having so horny a covering as some of the other diptera, such as the Muscidæ. They are covered with short fine hair.

The food of the males, in the imago state, is the nectar of flowers; but the females, although we believe that they also eat honey, feed on the blood of cattle, horses, and even men, whose skin they pierce by means of their elaborately constructed mouths.

The males of the Tabanidæ are far less frequent than the females. They may be recognized by their two eyes touching each other, instead of being, as in the female, far apart: the upper halves generally have larger lenses than the lower, and are furnished with a hair at each angle of the lenses, while the lower halves have no hair. The mouths of the males have no mandibles (*md*, fig. 96), and consequently are not adapted for piercing the skin of animals.

According to Walker's classification, the Tabanidæ are the third family of the Brachycera, and there are three British genera, viz.,—*Tabanus*, *Hæmatopota*, and *Chrysops*. Individuals of the first-named are plentiful (too plentiful, in fact) in hot countries; but although the species are numerous, they are comparatively rare in England; and therefore our intention is to notice, not so much the genus *Tabanus*, as the much commoner genera *Hæmatopota* and *Chrysops*. We will therefore dismiss the Tabani with noticing by what features they may be known when found.

On comparing the three antennæ (fig. 93, *a*, *b*, and *c*), it will be seen that that of *Tabanus luridus* has a tooth or projection at *: this tooth is present in the genus Tabanus only. The wings, also, of this genus are almost colourless, thereby differing from those of the other genera as described below. We have given a figure of the wing of *Tabanus rusticus* (fig. 94) as a type of the wings of the Tabanidæ.

T. bovinus is the largest of our native diptera; it is one inch long, including antennæ, and is also very broad and thick.

HÆMATOPOTA.—Perhaps there is no entomologist who has not been troubled, when hunting insects in the summer, by a grey fly with a large head, bright eyes, and grey wings folded over the back when at rest. It has a rather peculiar appearance, and non-entomological friends, when they see it, are apt to exclaim, "Oh, what a curious moth!" It flies slowly round and round one's head with a deep but indistinct hum, and not only pierces the face and hands with its sharp lancets, but has a ridiculous habit of poking its tongue into the seams of one's coat as if it would extract nutriment therefrom. This fly is *Hæmatopota pluvialis*. It is the commonest of the Tabanidæ, and it may be found in abundance in fields where animals are grazing, and in most places not far from water. Its size is variable, but it is usually about $\frac{4}{10}$ of an inch in length, and is less stoutly built than the rest of the Tabanidæ. The wings are nearly as long as the whole body, and therefore, when folded, they project beyond the tip of the abdomen; they are clothed with hairs of various shades of grey, which give them a pretty mottled appearance. The general venation of the wings is similar to that of Tabanus figured, but there is a remarkable short branch projecting backwards from the cubital vein at the spot marked * in fig. 94; this is a feature characteristic of the genus.

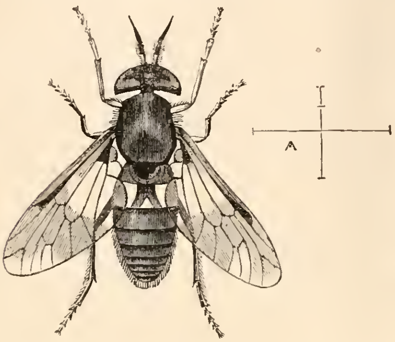


Fig. 92. Golden-eyed Gad-fly (*Chrysops cæcutiens*), female; × 3 diams. A. Natural size.

The antennæ are long, and project forwards from the head in a horizontal position: they are so fragile that the insect must be handled with great care during dissection. A drawing of an antenna of a male is given at *b*, fig. 93. It consists of six joints: in the female the basal joint is narrower than in the male. The eyes are coloured with alternate zigzag bands of metallic green and purple, and are very pretty. The mouth is interesting, and the entomologist should not fail to mount a slide or two of it for the microscope. The lancets are of considerable strength, and are capable of inflicting a sharp prick on the human skin, producing a small irritating swelling which is slow in healing.

Fig. 95 represents a foot of this insect: it is typical of the feet of the Tabanidæ, possessing two claws and one trilobed pad; the bristles with which the joints are covered are rather short.

The male of this species may be immediately recognized by a striking peculiarity of its eyes, their upper halves (which contain the larger lenses) being pale grey, almost white, while the lower halves are of the same colour as the eyes of the female. It may be recognized also by the largeness of the basal joints of the antennæ, and by the absence of mandibles from the mouth. To find males of this and other members of the Tabanidæ it is usually necessary to sweep with the net among flowers, long grass, &c., as they seldom fly forth, not requiring animal food.

Chrysops.—In company with the preceding insect one often meets with a few specimens of a less common but more conspicuous fly, *Chrysops cæcutiens*. It is somewhat similar in habits, but differs from the former in having an exceedingly rapid flight, during which it emits a peculiar hum, which is not likely to be mistaken after having been once heard. The sound is deep-toned, and more musical than that of any other insect which we know. Its flight has been described as silent, but we have found it quite the reverse.

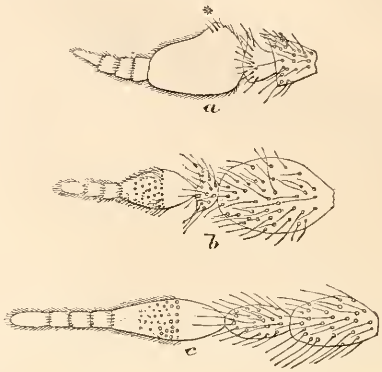


Fig. 93. *a*, Antenna of *Tabanus luridus*; *b*, Antenna of *Hæmatopota pluvialis*; *c*, Antenna of *Chrysops cæcutiens*; all × 20 diams.

Its eyes are most gorgeous, and no more beautiful sight of its kind can be conceived than the eye of a Chrysops under the microscope. Truly the fly well merits its name of "Golden Eyes." The ground colour is a most beautiful golden green; this is spotted with patches of purple lake, which, according to the play of light, seems to be ruby-coloured, indigo, or brilliant orange.

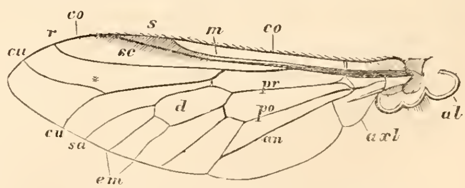


Fig. 94. Wing of *Tabanus rusticus* × 5 diams.
Names of Veins.—*co*, Costal; *sc*, Sub-costal; *m*, Mediastinal; *r*, Radial; *cu*, *cu*, Cubital; *sa*, Sub-apical; *em*, Externo-medial; *pr*, Præ-brachial; *po*, Post-brachial; *an*, Anal; *d*, Discoidal Areolet; *s*, Stigma, or Dark Spot; *axl*, Axillary Lobe; *al*, Alula.

The Chrysops is rather a "knowing" insect, having a habit of keeping behind one's back, which makes it somewhat difficult to catch. When at rest it carries its wings after the manner of a blow-fly, only more widely separated, and is in this respect quite different from the Hæmatopota. It is not so long as the latter fly, but rather broader. With the exception of an interrupted orange-yellow band across the base of the abdomen, the body of the insect is dark, but is clothed with silver-grey hair, which glistens in the sunlight.

The wings are very dark in colour; the parts shaded in fig. 92 are deep brown, and those not shaded are colourless and transparent. The antennæ have seven joints, the same number as those of the *Tabani*, but one more than those of the *Hæmatopotæ:* they are very long, and are carried horizontally. A drawing of an antenna is given at *c*, fig. 93.

Fig. 95. Foot of *Hæmatopota*, × 20 diams.

Fig. 92 represents a female *Chrysops cæcutiens.* The male has darker wings than the female, and its eyes are less brilliant, there being but few purple patches on the green ground-colour. The mouths of these three genera of *Tabanidæ* are all much

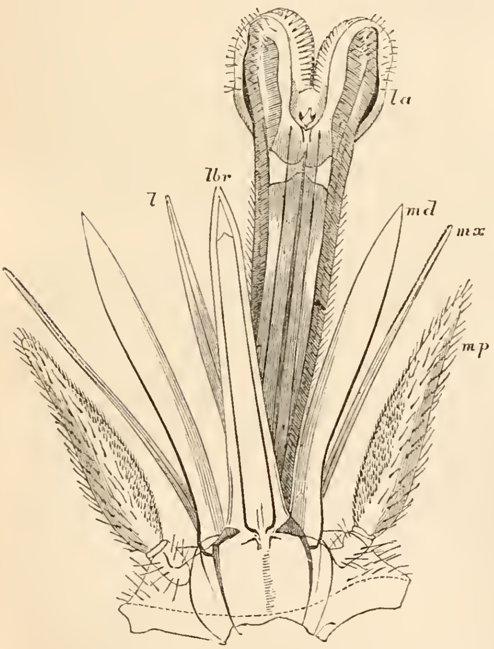


Fig. 96. Mouth of Female *Chrysops* × 28 diams.; seen from above, the Labium, *la*, being fully extended and partially expanded. *lbr*, Upper Lip, Labrum; *l*, Tongue, Lingua; *la*, Lower Lip, Labium; *md*, Mandibles; *mx*, Maxillæ; *mp*, Maxillary Palpi. The dotted line at the base of the drawing indicates that a piece of the epistoma covers the bases of all the organs, as shown in the figure.

alike in principle, although they differ of course in various particulars; for instance, the one here selected for description is longer than either of the others.

Fig. 96 represents the mouth of a female *C. cæcutiens.* In order to display all its organs perfectly, the specimen was subjected to a slight pressure. It is, therefore, somewhat distorted, for when the mouth is at rest the lower organs are partially or wholly concealed beneath the upper. The first object which presents itself is the upper lip or

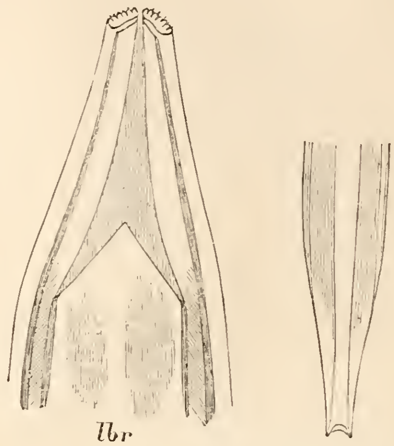


Fig. 97, × 165 diams. *L*, Tip of the Tongue; *lbr*, Tip of the Upper Lip, showing the curious rasps in which it terminates.

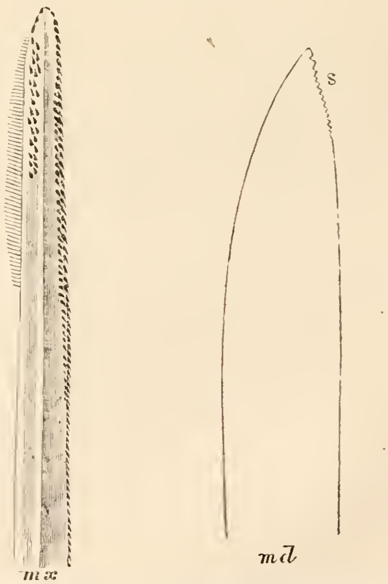


Fig. 98, × 165 diams.; *md*, left-hand Mandible, showing at *s* its serrated tip; *mx*, left-hand Maxilla, showing its fringe of hairs and sharp teeth.

labrum, *lbr*. This is a straight, stiff lancet; its articulation at the base is particularly strong, and it ends somewhat abruptly, in what look like two little rasps (see *lbr*, fig. 97). Below the labrum are the mandibles; their shape is that of a two-edged scalpel; they are very sharp, and the tips are serrated like a common saw (see *md*, fig. 98). When not in use, they and the tongue, *l*, are concealed beneath the upper lip, which is hollowed out underneath, so that a section would appear as a segment of a circle. The natural position of the maxillæ, *mx*, is nearly the same as in the figure, but they are not so wide apart. They lie beneath the mandibles, and are furnished with a pair of palpi. One edge is set with small recurved teeth, and the other is fringed with fine hairs. Immediately beneath the mandibles (when they are at rest) is the tongue: this forms the cover of a groove in the labium. The groove may be seen in the figure, and through the tube so formed the blood is sucked up into the throat. The lower lip, or labium, *la*, as is usual in diptera, is the most conspicuous part of the mouth: the capillary channels of the lobes are long and numerous, forming a good contrast to those of a humblebee-fly's mouth, but they are few compared with the number on the lip of a Tabanus. Being situated on the inner sides of the lobes, their commencement only is shown in the figure, which represents the labium fully extended, with its lobes partially separated as if for suction.

In naming the organs of the mouth we have followed the nomenclature of Curtis, Westwood, and Walker. B. T. Lowne, in an article on "Mouths of Insects" (SCIENCE-GOSSIP, page 109, 1874), gives a different arrangement, calling the mandibles the "great maxillæ," and the maxillæ "labial palpi." We prefer to consider as mandibles the parts we have thus named, because they are in exactly the right position for these organs, viz., immediately beneath the labrum, one on either side of it: their structure indicates the same thing, for they are without hairs or palpi. All authors agree in denominating the palpi, *mp*, "maxillary palpi"; and there seems no doubt that they are the homologues of the palpi at the bases of the maxillæ in bees. Now in the mouths of the flies, Rhingia, Empis, and Bombylius, these said palpi are very plainly seen to be articulated to the bases of the organs which Mr. Lowne calls "labial palpi" in the mouth of Tabanus. From this we think it may be reasonably inferred that they are not labial palpi, but maxillæ. Further, we believe that palpi are never set with teeth like these organs, but have hairs scattered irregularly over their surface, which these have not.

We have never met with the larvæ of any of the Tabanidæ, but it is stated by Professor Westwood that they are to be found in the earth; they are long worm-like grubs with twelve segments, and they have no feet.

Gad-flies appear only in the summer, and are most abundant in July. It is useless to search for them except in sunny weather. The commonest genus, *Hæmatopota*, is scarce on a dull day, while even a cloud passing over the sun will cause Tabani and Chrysopa to hide themselves—where, we have never been able to discover.

FRANK J. ALLEN & H. M. J. UNDERHILL.

THE FLORA OF AN OLD GARDEN WALL.

OLD walls are often very prolific in their vegetable inhabitants, especially when built of the friable claycy brick so commonly used at present, so that when our modern walls are old enough we may look forward to an abundant and varied crop.

My garden wall, though not very ancient, presents so many forms, that a short description of it and them may interest some readers of GOSSIP. It surrounds three sides of a rectangle, the long side of which is shaded by trees. Its top projects some four or five inches on each side, and it is here that the majority of plants are to be found. Of Phanerogams, *Antirrhinum majus* is conspicuous, partly natural and partly growing from seed scattered. Sundry tufts of *Aubrietia deltoidea* (also planted), show their bright lilac cushions. Amongst the species truly wild I find *Sonchus arvensis*, *Senecio vulgaris* and *S. Jacobæa*, *Sagina apetala*, *Trifolium arvense*, *Chrysanthemum segetum*, *Taraxacum dens-leonis*, *Stellaria minor*, *Hypochœris radicata*, *Potentilla reptans*, *Veronica hederifolia*, *Bellis perennis*, *Poa annua*, *Cerastium arvense*, and Parsley. Sundry fruits have also made their appearance, carried no doubt by birds—strawberries, raspberries, mountain ash, gooseberries, ivy, woodbine, and the garden Ribes. I even met with specimens of the yew, *Taxus baccata*, and the common sycamore, growing from seeds dropped from neighbouring trees.

Of the Cryptogamia, mosses and lichens, especially the former, are pretty numerous, including the following species: *Tortula muralis*, *Grimmia pulvinata*, *Bryum argenteum*, *B. capillare*, *Hypnum velutinum*, *H. rutabulum*, *H. cuspidatum*, and possibly one or two others. Of the lichens the most abundant are *Borrera stellans*, *Parmelia saxatilis*, and *Cladonia pyxidata*. This list includes twenty-seven flowering plants, seven mosses, and three lichens; one fern only has made its appearance, *Scolopendrium vulgare*. Algæ and fungi are conspicuous by their absence, the latter being only represented by some doubtful sphæraceous forms, at least at this time of year. In summer sundry parasitic species sometimes make their appearance. This list is the result of a very cursory examination; a more detailed one would probably reveal other forms. Unfortunately I am no entomologist, or I doubt not the fauna of our garden wall would be as numerous and interesting as its flora, or more so.

G. D. P. M.

INSULAR ENTOMOLOGY.

THE views of Mr. Darwin respecting the changes which insects undergo under insular conditions, and where islands have been for a long time separated from mainlands, have been abundantly borne out by the researches of the naturalists attached to the Transit of Venus Expedition to Kerguelen's Island. This island lies in the Southern Indian Ocean, and was discovered by the French navigator Kerguelen, in 1772, by whom it was considered to be a projecting part of the southern continent. A mountain-range, attaining the height of 2,500 feet, runs across the island south-westerly. The island is deeply indented with bays and inlets, and numerous lakes abound; but the physical and geographical conditions do not seem to be much diversified. Its botany, which is rather meagre, was studied during Ross's Antarctic expedition, but the report of the Rev. A. E. Eaton, M.A., the naturalist to the recent expedition, which has just been published in the "Proceedings of the Royal Society," gives a fuller and more philosophical view of the natural history, especially of the entomology, of the island. From this we give the following extract.

Mr. Eaton says the entomology of Kerguelen's Island is very interesting. "Most of the larger insects seem to be incapable of flight. I have found representatives of the orders *Lepidoptera*, *Diptera*, *Coleoptera*, and *Collemboia*. The Lepidoptera comprise a species of the *Nocturna* (as I suppose) and one of the *Tineina*. Of the first I have not reared the imago; the larva is a moss-eater and subterranean; the adult is probably as large as an *Agrotis* of medium size. The species of *Tineina* is probably one of the *Gelechiidæ*, judging from the form of the palpi. Its larva feeds on young shoots of *Festucæ*, and sometimes spins a silken cocoon for its pupa. The imago, of which the sexes are alike, has acute and very abbreviated wings, and the posterior pair extremely minute. In repose the antennæ are widely separated, and almost divaricate. When the sun shines the adult is active, and, if alarmed, jumps to a distance of two or three inches at a time. During its passage through the air the wings are vibrated.

"The Diptera are represented by species of the *Tipulidæ* and *Muscidæ*. There are three of the former family. One of them is a species of *Cecidomyiidæ*, which is abundant in mossy places, and presents no marked peculiarity. Another seems to be a degraded member of the *Tipulidæ*. The antennæ have six joints, the palpi two; the wings are ligulate and very minute. It possesses halteres, and the female has an ovipositor enclosed in an exposed sheath. Although it is unable to fly, it lives upon rocks in the sea, which are covered at high water, and there it deposits its eggs in tufts of *Enteromorpha*. The third species has full-sized wings. It was caught in the house. The indigenous *Muscidæ* are very sluggish in their movements, and are incapable of flight. Four species are common. One of them is abundant on *Pringlea*, crawling over the leaves. When it is approached it feigns to be dead, and, tucking up its legs, drops down into the axils of the leaves. Or, if it happens to be thrown upon a plane surface, one need only look at it closely, and it throws itself promptly upon its back, and remains motionless until the danger is over, when it gradually ventures to move its limbs, and struggles to regain its footing. Its wings are represented by minute gemmules, and it possesses halteres. The ovipositor is extended, its apical joint alone being retracted. The larva feeds upon decaying vegetable matter. Another species occurs on dead birds and mammals, as well as beneath stones nearest the highest tide-mark. It is completely destitute of even the vestiges of wings and halteres. It and the preceding species are rather smooth. A third species, slightly hairy, is common amongst tide refuse, and on the adjacent rocks, which are coated with *Enteromorpha*, on which plant the larva feeds. It has very small triangular rudiments of wings, slightly emarginate near the apex of the costa, and possesses halteres. The fourth species occurs amongst grass growing on the sea-shore, and also in Shag-rookeries. Its linear and very narrow wings are almost as long as the abdomen. It can jump, but cannot fly."

Coleoptera are not uncommon. The larger species seem to have their elytra soldered together. There is a small species of the *Brachelytra*. Two species of *Poduræ*, one black and the other white, are plentiful. There appear to be few species of spiders, though individuals are numerous. Penguins and some of the other birds are infested with ticks. The remaining arachnids are related to *Cribates*. The plants in Kerguelen's Island are apetalous and self- or wind-fertilized—a fact correlated with the wingless condition of the insects, which is believed to be due to the general high winds prevailing, and which would carry winged insects out to sea, and so destroy the species, unless the wings became aborted.

DIATOM COLLECTING.

AS the beauty of mounted diatoms depends in a great measure on the cleanliness of the original gathering, sand and other impurities being difficult to get rid of in after-manipulation, I have found the following addition to the ordinary collecting apparatus, of very great assistance. It has the advantage of being easily made, and with its aid much better results can be obtained than by any other means.

A cork must be provided which fits tightly to the collecting-bottle; this is to be bored with two holes; in each is fitted a glass tube, as seen in the diagram, one (*a*) having a slight curve, the other (*b*) bent at right angles an inch from the end; this can easily be done with the aid of a spirit-lamp. To tube *b* is attached a piece of elastic tubing, about the length of the collecting-stick, and the free end (*c*) may be held to the stick with an elastic band, and the apparatus is complete.

It is especially useful in collecting the very thin films of diatoms from the surfaces of mud and sand, so difficult to raise to the surface of the water in the ordinary way with the spoon or bottle.

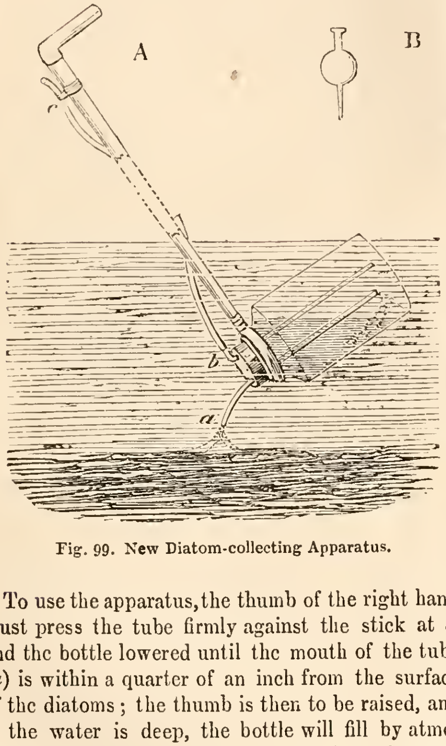


Fig. 99. New Diatom-collecting Apparatus.

To use the apparatus, the thumb of the right hand must press the tube firmly against the stick at *c*, and the bottle lowered until the mouth of the tube (*a*) is within a quarter of an inch from the surface of the diatoms; the thumb is then to be raised, and if the water is deep, the bottle will fill by atmospheric pressure, carrying the diatoms in at the same time. In shallow water suction will be necessary to exhaust the air in the bottle: in that case a ball pipette (fig. *B*) will be useful as a mouthpiece.

The gathering can be further cleaned by placing it in a long bottle in the sun for a few hours. Cover the lower part of the bottle with black paper, when the free diatoms will separate themselves from the mud, and rest on the surface.

Bolton. JOHN REDMAYNE.

"IN a general sense we may say that the mechanism of respiration is the same in animals and plants."—*Masters.*

A CHAPTER ON WINGLESS BIRDS.

BY T. W. WONFOR.

THE following paper was read at a meeting of the Brighton Natural History Society, by Mr. T. W. Wonfor, Curator of the Brighton Museum, and is a careful compilation of one of the most peculiar and suggestive of all the orders of birds:—

The idea ordinarily associated in the mind with the word 'bird' is that of a creature possessing the power of flight, and, as a matter of consequence' provided with wings. In the north of England 'bird' or 'brid' is a term used when speaking of any flying thing, so that a moth, butterfly, or beetle would be equally included under the term 'bird.' Now as there are wingless or brevipennate insects, the question may arise, Are there wingless birds, in the usual application of the term? We know that the expressions 'wingless' and 'brevipennate' have been applied to some members of the family *Aves*, yet still we fancy, if we inquire into the character of those birds which have been so designated, we shall find that, though we cannot in all cases hold that they are flying creatures, yet no one member of the great family of Aves is absolutely deprived of wings. They may be merely rudimentary, as in the case of the *Apterix*, or changed into flappers or paddles, as seen in the Penguins, but still they are present, and correspond with the anterior pair of limbs found in all members of the family possessing the power of flight.

The Apterix Australis.—It is related that a few years since the skin of a bird brought home by some one from New Zealand, was given to a taxidermist to set up, and he, taking into consideration the shortness of wing and absence of tail, assuming that it was a penguin, stuffed it in a sitting posture, with the head and neck arranged after the manner of the Penguins. This bird proved to be the *Apterix Australis*, a native of New Zealand, and, for a bird, exhibiting peculiar features. In addition to an almost want of wing, it presents a strange appearance, the plumage consisting of long, flat, slender, lanceolate feathers, each furnished with a soft, shining, silken down, for the basal third of their length, and then narrowing rapidly towards the extremity, where they present the appearance of single shafts, with hair-like webs on each side. The quill portion is very small and short, and overlapped by the down when the feathers are removed from the skin. Above and below the eye, at the base of the beak, and on the forehead, are groups or pencils of long whisker-like hairs. As the Kiwi, as the natives call it, is nocturnal in its habits, and lives among the fern-beds, boring into the ground, and seeking shelter in deep excavations, these hairs may serve the same purpose as the whiskers of the cat, and supplement the eye, which, unlike that of the other nocturnal birds, is small. So small is the organ of vision, while the cornea is very convex, and the olfactory system so much larger than in other birds, that Professor Owen remarks, "The nocturnal habits of this bird, combined with the necessity for a highly developed organ of smell, which chiefly compensates for the low condition of the organ of vision, produce the most singular modifications which the skull presents, so that it may be said that those cavities which, in other birds, are devoted to the lodgment of eyes, are in the Apterix almost exclusively devoted to the nose." The nostrils externally are very narrow, very small, and set on each side of the tip of the long curved beak, which at this point is somewhat swollen. The internal olfactory apparatus and the pituitory surface, on which the olfactory nerve freely ramifies, is complex and extensive. Like all the *Cursores*, the legs are very strong and muscular, the tarsi short and stout, the toes, four in number, without intervening webs, the three anterior strong, and armed with powerful claws, the hinder one short, and terminated by a sort of spur, with which it is said to defend itself very vigorously, by striking very rapidly, and with great force. The eggs, for so small a bird, are of great size, and show the absurdity of judging of the size of an animal from the size of the egg. The eggs weigh on an average 14¼ ounces, while the adult bird weighs 60 ounces; the proportion being about 1-4th, while in the common fowl it is 1-48th, and in the case of the ostrich 1-100th; with some animals, such as the alligator and crocodile, it is much less.

Gigantic Birds.—There are, or, if extinct, were, birds of far more gigantic proportions, viz., the Dinornis and Notornis of New Zealand, and the Æpiornis of Madagascar. The *Dinornis giganteus* stood from 12 feet to 14 feet high. Two portions of bone in the Brighton museum would quite lead, were other evidence wanting, to the belief that the bird was not only of gigantic dimensions, but possessed of immense power of stride. In connection with this bird, it is said that some years ago a traveller returning from New Zealand brought with him a few inches of bone. This was before the days of the gold discovery; the traveller had heard of the gigantic birds of New Zealand, and also of Professor Owen, to whom the piece of bone was presented. It was big enough in diameter to have been the bone of an ox, but upon examination Professor Owen noticed a peculiar cancellated structure only found in the bones of birds. A bird to possess such a bone must have been considerably larger than an ostrich. He therefore set to work to construct an outline of the bird. The figure, when produced, caused no small amount of disbelief, and, as some thought, showed hasty conclusions on Owen's part. But, causing inquiries to be made in New Zealand, some disjointed bones turned up; these were packed up and sent in a trunk to London; when put together they formed the incomplete skeleton in the Museum of the College of Surgeons. From 14 feet to 16 feet appears to be the height assigned to the *Dinornis giganteus;* the tibia (leg-bone) measures 2 feet 10 inches, and the legs to the root of the tail 6 feet. An egg found in the volcanic sand by Mr. Walter Mantell, was so large that he said his hat would serve as an egg-cup for it. What became of this egg is not known. If, as is asserted by some, the bird is still existing, we may in time obtain a living specimen, or if the capture alive is impossible, at least the skin and bones.

The Notornis Mantelli.—Another brevipennate bird of the same country, the *Notornis Mantelli*, was captured alive in the year 1849 by some seal-hunters. They were ashore in one of the coves of Dusky Bay, the south-west extremity of Middle Island, when observing the footprints of a large and strange bird in the snow, they followed the trail, and at length came in sight of the bird itself. After a long chase, in which their dogs were very much distressed, they came up with and caught it alive, in a gully behind Resolution Island. They kept it alive on board their schooner for some days, and then killed and skinned it, roasting and eating the flesh, which they pronounced delicious. The skin was procured by Mr. W. Mantell, and sent to England. This bird stood about two feet high, the beak was short and strong, wings very short and rounded, plumage feeble, legs and feet more adapted for the land than those of the ordinary rails; plumage rich purple on neck, breast, and abdomen, back and wings decked with green and gold, tail scanty and white beneath; beak and legs when the bird was alive bright scarlet; this has since faded.

An Enormous Egg.—In the Brighton Museum is the cast of an egg of enormous size. This is in reality a fac-simile of an egg of the *Æpiornis maximus* (a supposed extinct bird of Madagascar), in the possession of Mr. Dawson Rowley, of Brighton, who has published a pamphlet upon it. Some idea of its comparative size may be gathered when it is stated that it would take 148 fowl's eggs to equal it. The idea respecting this egg is that it was laid by a bird of far larger size than the Dinornis, and, if not still existing in the unexplored parts of Madagascar, that it has not been extinct more than a couple of centuries. Professor Owen, speaking of the eggs of this bird in a paper read before the Zoological Society in 1852, entitled "Notes on the Egg and Young of the Apterix, and on the Casts of the Eggs and certain Bones of the Æpiornis," thought it very unscientific to estimate the size of a bird from the size of its eggs, and proceeded to show, first, that the egg of the Apterix might have led to a supposition of its having been laid by a much larger bird; and secondly, that from a comparison of the bones, the Æpiornis did not equal in size the *Dinornis giganteus.*

Brevipennate Birds.—Little more than 200 years ago there were on the islands of Mauritius, Bourbon, and Rodriguez, sundry brevipennate birds, the *Dodo, Solitaire*, &c., in great abundance, and, till recently, but a head, a couple of feet or so, and a few bones, with some paintings, were all that remained to tell us of a very interesting group of brevipennate birds. Much interesting matter respecting these will be found in a work entitled "The Dodo and its Kindred." The living specimen of the Dodo exhibited in London in 1639 passed into the hands of Tradescant, and when his museum was presented to the University of Oxford by Ashmole, it contained a perfect stuffed dodo. On January 8th, 1755, by an order of the Vice-Chancellor and his co-trustees, it was ordered to be burnt, the head and foot alone escaping destruction. Excavations made in 1865 in the Mauritius by M. de Bissy, for the purpose of utilizing the soil of a marsh for manure, led to the discovery of various bones, including those of the Deer and Tortoise. Mr. Clark, who had long had an opinion respecting the possibility of finding bones of the Dodo, told M. de Bissy his views. This led to a systematic exploration, and the discovery of many bones of that bird, and now, in the British Museum, may be seen an almost perfect skeleton.

African Ostriches.—Leaving the region of the comparatively unknown, we come to well-known examples of wingless or brevipennate birds, all belonging to the true *Cursores;* these are the Ostriches, the Emeu, and the Cassowaries. The best known species is the Ostrich, *Struthio Camelus*, an inhabitant of the African continent. This bird, which has been celebrated since the most remote antiquity, and a dish of whose brains was an epicurean dish in Old Rome, measures from six to eight feet in height; its feet consist of only two toes; the head and neck are nearly naked, the general plumage very lax, the quill feathers of the wings and tail remarkable for the length of their barbs, which, though furnished with barbules, are completely separate from each other, and form the well-known ostrich feathers of commerce. The ostriches live together in large flocks, feeding upon grass, grain, wild melons, &c., and, like the gallinaceous birds, which they resemble in their food, have an enormous crop and a strong gizzard. In a state of nature it picks up and swallows small pebbles; but in confinement it has swallowed brickbats, knives, old shoes, scraps of wood, tenpenny nails, bits of iron, and feathers; one went to the length of swallowing in succession the whole of a brood of young ducks; whether impelled by normal hunger, a morbid appetite, or sheer mischief is an open question. Another tried to swallow its blanket. The voracity of the Ostrich formerly gave rise to the belief that it fed on iron. The African ostrich is polygamous and gregarious. The female scratches a hole in the sand, in which she lays ten or twelve eggs in an upright position. The male and female both sit upon the eggs during the night, and this sitting, supplemented by the heat of the sun, hatches those in the middle of the nest, the outer ones, when the centre eggs are hard and the young birds nearly hatched, being quite fit for food; the eggs weigh upon an average 3 lb., and are regarded as great delicacies. Though equal in weight to twenty-four hen's eggs, one is not thought enough for a meal, and in one instance two men finished five eggs in the course of an afternoon. The approved method of cooking is to place the egg upright on the fire, break a hole in the top, through which a forked stick is forced. This is made to rotate by rubbing with the hands, and so beats up the contents while cooking.

American Ostriches.—The American ostriches contain two species, *Rhea Americana* and *R. Darwinii*, and are scarcely more than half the size of the African species, from which they also differ in having the head and neck covered with feathers, and the feet furnished with three toes. The feathers of the wing and tail, though elongated, possess none of the beauty of the African ostrich, and are only employed in the manufacture of light dusting-brooms. They are very abundant in the large plains of America. The food consists mainly of grasses, roots, and other vegetable substances, but they will occasionally eat animal food, being known to come down to the mud-banks of the rivers for the purpose of eating the little fish that have been stranded in the shallows. Darwin, who had frequent opportunities of observing these birds, has given an excellent account of their habits. He says:—"They take the water readily, and swim across broad and rapid rivers, and even from island to island in the bays. They swim slowly, with the greater part of the body immersed, and the neck extended a little forwards. On two occasions I saw some ostriches swimming across the Santa Cruz river, where it was 400 yards wide and the stream rapid." It is polygamous; the male bird prepares the nest, collects the eggs, which are frequently laid by the females at random on the ground, and performs all the duties of incubation. Darwin says four or five females have been known to lay in the same nest, and the male, when sitting, lies so close that he himself nearly rode over one. At this time they are very fierce, and have been known to attack a man on horseback, trying to kick and leap on him.

The Australian Emeu.—The Emeu of Australia, *Dromaius Novæ Hollandiæ*, is nearly as large as the African ostrich, measuring from 5 feet to 7 feet in height. It has three toes on each foot, and these are furnished with nearly equal claws. The head and neck are covered with feathers, the throat being bare; the plumage of the body, closely resembling long hairs, hangs down on each side of the body, from a central line or parting. These birds, at one time abundant in Australia, are now becoming extinct, for natives and Europeans are fast thinning them, the former eating the eggs, and hunting down the emeus for food, but not allowing boys or women to partake of it, the flesh being reserved for warriors and counsellors. Europeans and settlers run it with dogs, trained on purpose, for food, sport, and also for a valuable oil, of which as much as six or seven quarts are yielded by a single emeu. This oil is of a light yellow colour, is used as an embrocation for bruises or strains, and, not readily congealing or becoming glutinous, is also useful for oiling the locks of firearms. The birds are monogamous, the male performing the office of incubation; the nest is made by scooping out a shallow hole in the ground, in some scrubby spot, and in this depression a variable number of eggs is laid. Dr. Bennett remarks that "there is always an odd number, some nests having been discovered with nine, others with eleven, and others with thirteen." These eggs are nearly as large as those of the Ostrich, but of a dark green colour, and the young, when first hatched, are elegantly striped with black and grey. In defending itself it does not kick forward like the Ostrich, but sideways and backwards like a cow.

The Cassowary and the Mooruk.—The Cassowaries, of which there are two—the Cassowary proper, *Casuarius galeatus*, and the Mooruk, *Casuarius Benettii*—are natives of the Eastern Archipelago. The former, standing 5 feet high, is distinguished by the possession of a peculiar horny crest or helmet upon the head, by the wings being furnished, instead of feathers, with about five cylindrical stalks, destitute of barbs, and by the large size of the claw on the inner toe. The head and neck are naked and wattled, and of a bright red, variegated with blue. The rest of the body, which is very stout, is clothed with long glossy black pendent feathers, more closely resembling hair than those of the Emeu. It feeds upon herbs, fruit, and seeds, and, like the Ostrich, swallows hard substances. The eggs are of a greenish tint. The eye is fierce and resolute, and the character of the bird is tetchy, and apt to take offence without any apparent provocation. Scarlet cloth excites its ire, and it has a great antipathy to ragged and dirty persons. The height of the Mooruk is 3 feet to the top of the back, and 5 feet when standing erect. The colour is rufous, mixed with black on the back and hinder portions of the body, and raven-black about the neck and breast; the loose wavy skin of the neck is coloured with iridescent tints of bluish purple, pink, and an occasional shade of green; the feet and legs are large and strong, of a pale ash-colour, and exhibit a peculiarity in the extreme length of the claw of the inner toe of each foot, it being nearly three times the length of the claws of the other toes. Instead of the helmet-like protruberance of the Cassowary, it has a horny plate resembling mother-of-pearl darkened with black-lead.

The Penguins.—Another set of birds, if not wingless, must also be mentioned. These are the Penguins, in which birds the wings are reduced to a rudimentary character, are destitute of quills, and are covered with a scaly skin, forming flat fin-like paddles, the scales being rudimentary feathers. In the water, which appears their natural element, they use them in swimming and diving. On shore they use the paddles as anterior legs. From the backward position of their feet the Penguins can only stand in a very upright attitude, in which position they may be seen in countless numbers arranged in as compact a manner and in as regular ranks as a regiment of soldiers, and classed with the greatest order, the moulting birds in one place, the young ones in another, the sitting hens by themselves; the clean birds in another place, &c. So strictly do birds in a similar condition congregate, that, should a bird in a moulting state intrude amongst those which are clean, it is immediately ejected from among them.

The Plumage of Wingless Birds.—Apart from what may be called the absence of wings, or rather the presence of merely rudimentary wings, wingless birds, leaving possibly the Penguin and Dodo out of the category, are distinguished from other birds by certain marked qualities. In all of them the plumage differs from that of those possessing the power of flight, the barbs of the feathers being always separate, and the whole covering approaching very nearly the character of the hair of animals. The bones, too, are almost destitute of the air-cells, which give so much lightness to the skeletons of ordinary birds, and assimilate more closely to mammalian bone. From the mere rudimentary character of the wings there is an almost absence of pectoral muscles, and the sternum is reduced to a simple convex shield without any trace of the keel which in other birds gives attachment to the powerful pectoral muscles. To compensate for this deficiency, the great size and muscularity of the legs render the pace of these birds in running very swift. The pelvis is of large size, and the two sides of the arch unite at the pubis: this is not the case in other birds. The anterior toes are strong, either two or three in number, and terminated by strong nails. The hinder toe, except in the genus Apterix, where it is rudimentary, is entirely wanting. So strong are the legs and muscles in the Ostrich, that it will knock over a hyena with a stroke, or rip up a dog with its claw. At bay it has knocked down and trampled upon the hunter who approached it incautiously.

The Abode of Brevipennate Birds.—It must have been noticed that all the brevipennate cursores are confined either to islands or two Southern continents, and are of great size. How can this be accounted for? and is there anything to explain the fact? First, as regards the islands, it seems geologically evident that they, comparatively recently in geological time, formed a part of the great Asio-African continent, and that when the separation took place, the ancestors of all these gigantic and brevipennate birds were shut up in the islands, together with smaller birds, with the same lax plumage and feeble powers of flight, those only of large size and swiftness of foot escaping from their natural enemies shut up with them. That a ravenous and active enemy in a small island would soon cause the extinction of a small and feeble brevipennate bird, is seen by what happened in the Samoan group of islands. There was a Dodolet, the *Didunculus strigirostris*, a pet with the natives, and a connecting link between the true pigeons and the Dodo. European vessels touching at these islands left behind them rats, which increased and multiplied until, like Dick Whittington's so-called cat of fable, but not the ship of reality, they introduced the domestic cat; it not only kept down the rats, but destroyed the Didunculus, which became, as was believed, extinct, until a few months ago living specimens were found, and wrongly described in the journals as the true Dodo.

The Silk Fowls.—Absence of wings and hairiness of plumage is seen under domestication in what are known as Silk Fowls. The origin is said to have been from an ordinary pair of Chinese fowls. A single bird thus clothed was hatched from an egg laid by the hen, the cause, though determining the variation, being unknown. By a careful and long-continued selection of the offspring of this fowl, showing the most complete tendency to develop the peculiarity of feathers, the breed of silky Cochins was at length established. It is well known to pigeon-fanciers that similar laxity of plumage exists among them. Given, therefore, a tendency to laxity of plumage, and but moderate powers of flight, natural selection will explain, on Darwin's hypothesis, how, as the powers of flight diminished, only the larger and more powerful would survive, while the smaller and feebler would easily fall a prey to their natural enemies, while the use of the legs and disuse of the wings would also in time produce the swift and strong *cursores* like the Ostrich, Emeu, &c.

A New Carex.—Messrs. Whitehead and Newton write to us concerning a new carex (*Carex ornithopoda*), which they first detected in Miller's Dale, Derbyshire, in 1874. They gathered it again on the dry and exposed parts of the limestone rocks in the same neighbourhood this year, and now offer in our exchange columns. It is a very interesting discovery.

ON THE DEVELOPMENT OF HYDRA VULGARIS.

By James Fullagar.

[Our readers are well aware that this careful observer has already contributed several important articles on the above subject to our Journal. We have now the pleasure of inserting one from the "Journal of the Quekett Microscopical Club," in continuation of the same series of investigations. —Ed. S.-G.]

It appears from the statements of various writers on Natural History, that the development of *Hydra* from ova has never or very rarely been witnessed, though, at the same time, no doubt is entertained of the *fact* that one of the means of its reproduction is from ova. I have had *H. vulgaris* and *H. viridis** under my observation for more than three years

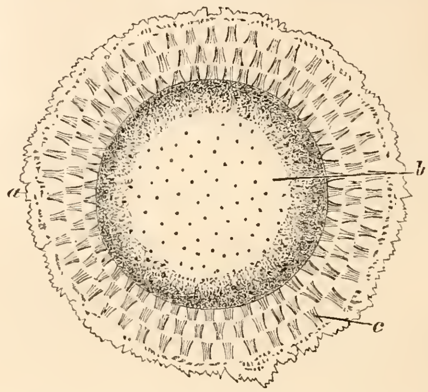


Fig. 100. Ovum of *Hydra vulgaris*. *a*, transparent envelope; *b*, short spines; *c*, triangular-shaped markings on envelope.

past, and, after various failures and disappointments, I have at length succeeded in witnessing the hatching out of several specimens of *Hydra vulgaris*.

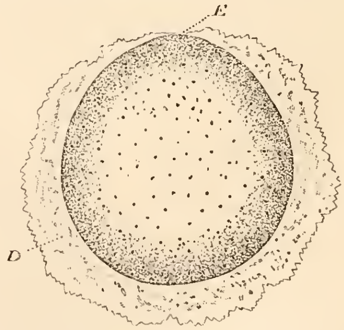


Fig. 101. *D*, appearance of envelope before the rupture of the egg indicated at *E*.

Hydra vulgaris differs in many respects from *Hydra viridis*. The egg is larger, and studded with what appear to be short spines (fig. 100, *b*).

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* A paper on the Development of *Hydra viridis* from Ova will be found in Science-Gossip for 1873, pp. 12 and 175.

The shell is not smooth, nor is it covered with an irregular network, as in *H. viridis*, but it is surrounded with a transparent gelatinous envelope, which it retains to the time of hatching. The egg of *H. viridis* has at first also an envelope, which disappears some time before hatching. In fig. 100, *c*, I have particularly marked the triangular-shaped

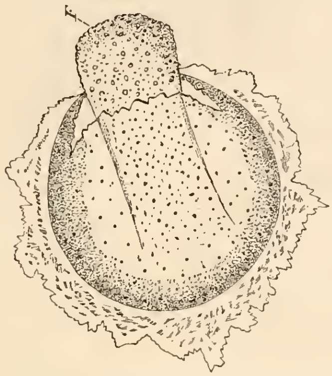


Fig. 102. *F*, part of the *Hydra* protruding from the egg.

darker spots in the envelope; they appeared as regular as in the sketch a little denser than the rest of the envelope, and surrounding the whole of the egg. This, however, can only be seen at the margin; but on moving the egg in the water, it may be seen on every part, and always presenting the same appearance. The diameter of the egg of *H. vulgaris* is one-fiftieth of an inch, that of *H. viridis* one-sixty-sixth of an inch.

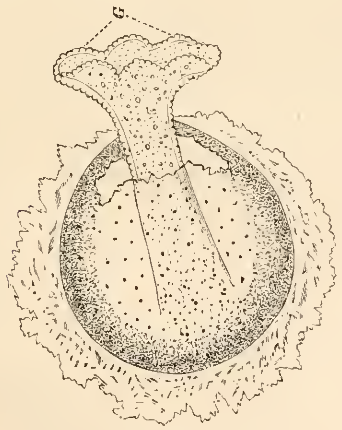


Fig. 103. *G*, indication of tentacles.

On October 27th, 1873, I placed in a glass cell a specimen of *H. vulgaris*, on which an ovum had begun to form. It was put into pure clean water by itself, so that nothing obstructed the view, and the changes which took place from time to time were very clearly observed. Besides the ovum it had three fully-developed sperm-cells (fig. 106, *K*), in which spermatozoa were seen in active motion, and from each of which, at intervals, a quantity was discharged into the surrounding water (fig. 106, *L*).*

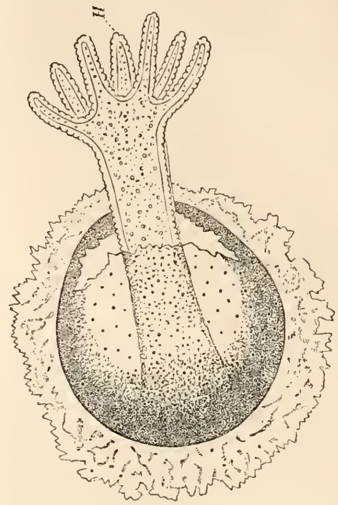


Fig. 104. *H*, further development of tentacles.

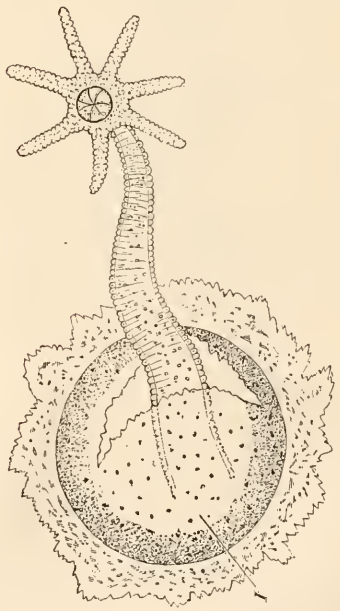


Fig. 105. Full development of young *Hydra*, fixed to the inside of shell at *I*.

* The spermatozoa were originally made out by Mr. Gulliver, F.R.S., who obtained specimens of the Hydra from me, and executed drawings of the spermatozoa, which are engraved in SCIENCE-GOSSIP, vol. for 1873, pages 13 and 41, and are the first representations published of these objects in this country, if not in the world. My own objectives were not of sufficient power for such delicate investigations, but Mr. Gulliver, with Powell & Lealand's one-sixteenth, was well prepared.

On Oct. 30 the egg (fig. 106, *M*) became detached from the *Hydra*, and sank to the bottom of the cell; it then presented the appearance of fig. 100. It was at first of a cream-colour, which soon changed to orange. It should be noticed that the gelatinous envelope frequently becomes covered with extraneous matter, through which the egg cannot easily be seen; this may account for the difficulty of obtaining the ova from ponds and ditches, as they are so well concealed from observation. The collection of substances around the eggs, acts, I believe, as a protection from pressure, for on leaving the *Hydra*, they are very soft, and easily crushed. I have seen small *Cypris* burst them at an early period; but they soon become hardened so as to resist pressure, and can then be removed with a dipping-tube for observation.

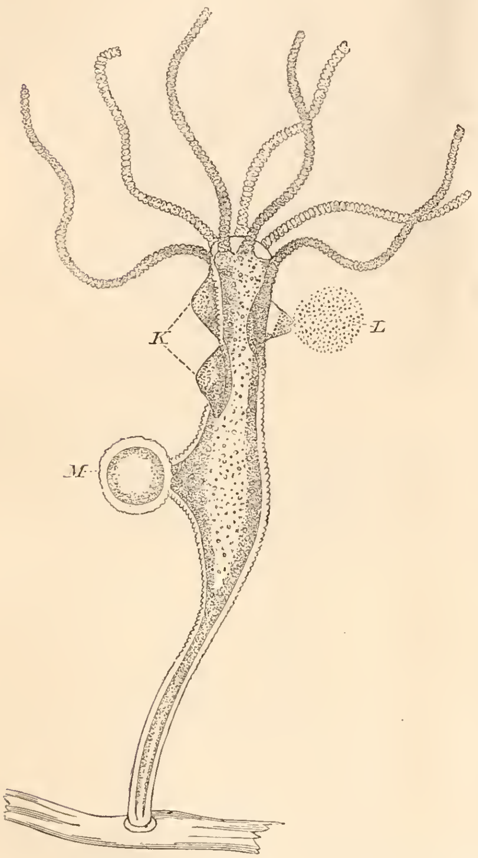


Fig. 106. *Hydra*; *K*, sperm-cells, of which there are three; *L*, discharge of spermatozoa; *M*, ovum about to leave the body.

The ovum is at first globular, but if it falls in its soft state on a flat hard substance, the underside becomes flattened, making it hemispherical or helmet-shaped: this does not hinder its proper development.

As the time for hatching approaches, the envelope surrounding the egg becomes irregular (fig. 101, *D*), and the egg is slightly pushed out on one side (fig. 101, *E*). In the specimen above mentioned this change was observed on January 24th, fifty-five days after extrusion; in a few minutes a slight crack was seen in the shell, and a portion of the young *Hydra* slowly emerged from it, in a rounded form, as shown in fig. 102, *F*, sketched two hours after the first perceptible crack in the egg. It continued slowly emerging, and in two hours afterwards rudiments of tentacles appeared, as rounded lumps (fig. 103, *G*). Seven hours after the first rupture of the egg, the tentacles had progressed to the condition shown in fig. 104, *H*, and in twelve hours the *Hydra* was fully developed, with seven tentacles, and in all particulars like the adult, size only excepted. Its appearance was most interesting,—delicately pure, and beautifully transparent, as if made of crystal, and still attached to the inside of the shell by the suctorial disc at the posterior end of the body (fig. 105, *I*). Some specimens finally leave the shell about twelve hours after being fully developed, others twenty-four, or even sixty hours afterwards, when they fix themselves to the bottom or sides of the cell. Their growth is very slow, and I could not discover what they took as food. After a month had elapsed, I introduced some small entomostraca, but though they seized them with their tentacles, they could not absorb them. The entomostraca died, however, from the effect of the stinging power of the tentacles. The young have not all the same number of tentacles; one observed had five, most had six, and some few had seven.

After the extrusion of the ovum, the parent *Hydra* gradually diminished, the tentacles shortened and slowly disappeared, and in about twenty-one days the whole body dissolved. The sperm-cells, three in number, continued on the body for some days after the ovum had been separated from it, and continued to discharge spermatozoa into the water.

Both ovi-sac and sperm-cells are usually found on the same *Hydra*; but sometimes sperm-cells only are found, when the whole length of the body is studded with them. I have counted in some cases eleven, in others seventeen, and in one as many as twenty-three; but where an ovum is formed the sperm-cells rarely exceed four in number.

The reproduction of *Hydra vulgaris* from ova takes place in the autumn, and that of *Hydra viridis* in the spring.

"The most important organic substances met with in Nature are those in which carbon is associated in various multiple proportions with the elements hydrogen and oxygen; next in importance are those containing nitrogen in addition to these; sulphur and phosphorus are also present in some few."—*Armstrong's Organic Chemistry.*

A FEW MORE WORDS ABOUT BEES.

I CAN quite endorse the opinion of your correspondent "J. B. B." as to bees being very interesting creatures, and equally worthy of patient investigation as the more generally-studied butterflies and moths. With your permission I will say a few words from personal observation on the habits of the *Anthophora*, the Carder, and the Leaf-cutter.

The *Anthophora* is found in every garden. If you see a glossy jet-black bee, of medium size, hovering with quick and busy motion about your pet polyanthuses, and darting swiftly away as you approach, you may prettly safely conclude that it is a female *Anthophora*. Visit some old sand-pit or quarry in June or July, and you may then see how this "busy bee" provides for her young. One evening in the latter month, noticing perforations in the upper or earth part of a sand-pit cutting, and numerous bees of different kinds passing in and out, curiosity prompted me to open some of the holes. This I accomplished by chipping off pieces of the remarkably hard earth with my pocket-knife, and soon laid open to view the economy of the *Anthophora*. The hardness of the earth, and the consequent labour gone through by the bee in boring into it, greatly surprised me. One individual was busily at work in an adjoining hole, turning itself round and round within the tunnel by the help of its legs, and having done this for some time, stood upright and pushed out the accumulated earth with the lower part of its abdomen. On laying open the face of the cutting, I found that each tunnel or perforation made by the bees extended about two inches into it, and ended in two cells of an oval shape. These cells were substantially made of hard earth, and must have caused the insects immense labour to construct. They were smoothly lined with a hard white gum or similar substance. The cells of one tunnel contained a little, light, greenish, unpleasant-odoured paste or honey, on which floated a small white bee-maggot; another set of cells showed the bee-maggots so far advanced as to completely fill their allotted space; another showed the young *Anthophora* in the pupa state; and another exhibited the perfect bee, fully formed, coloured, and ready for flight. Flying with a buzz about the holes on the evening in question was another insect much resembling the *Anthophora*. Having procured specimens, I found it to be one of the tribe of insect-cuckoos—a *Melecta*, which, like its feathered prototype, makes no nest of its own, but places its eggs in the cells of the *Anthophora* when it can manage to do so unperceived. Where the *Anthophora* occurs, there its parasite may likewise be found.

The Carder Bee (*Bombus muscorum*) abounds in every country lane, and may be easily recognized by its dull orange-coloured thorax, and by its predilection for the rich honey-yielding blossoms of the white dead-nettle (*Lamium album*). The habits of this bee are very interesting. Years ago, when quite a boy, I made the acquaintance of the Carder. A favourite resort of mine then was a clump of Scotch firs, beneath whose ample shade grew a patch of peculiarly soft and luxuriant grass. One day, seeing what looked like a ball of dried grass lying under the trees, I picked it up, when a very ominous hum sounded from beneath, and I took to my heels with visions of smarts and blue-bags rising before me. I had unconsciously disturbed the nest of a Carder. Later on in the year, when the chills of autumn had rendered the colony less active and fierce, I ventured to uncover the nest again, and see for myself the result of the summer's activity. True there was little to be seen beyond a few irregular-shaped masses of dark-brown cells, containing a little honey—the Carder being a very indifferent honey-gatherer and wax-worker. But in the construction of its nest of withered grass or moss it displays great adroitness. The nest is raised dome-like above the level of the ground, and is the work of a row of Carders, the foremost one of the file taking a little grass or moss, carding it, and passing it under its body to the next, who pushes it in the same manner to its fellow behind. The tiny bundle of moss thus goes from one to another, till it reaches the nest at the end of the file. From its using moss in the construction of its nest, the Carder is often appropriately called the Moss Bee. It is one of the humble bees.

Most insect-admirers, even those who make no pretence to be considered entomologists, have heard of the Leaf-cutter Bee (*Megachile*), and the mathematical precision with which it cuts its circles and semicircles from rose and other leaves. In June, 1874, I noticed a rose-bush (*Rosa canina*),—by the way, I have met with the curious thorny gall (*Rhoditis rosarum*) on this bush at Tubney, Berks,—which had evidently been most extensively visited by Leaf-cutters, the greater number of the leaves being mutilated in the most exact and beautiful manner. A few days before this I had had the pleasure of seeing the Leaf-cutter transporting her materials to their destination. A certain sunny bank near a wood is frequented by immense numbers of insects, particularly sand-wasps (*Ammophila sabulosa*) and the numerous species of mining-bees. While watching the buzzing hosts, I noticed a bee fly to the bank, carrying a leaf between its legs under its abdomen, and soon after saw three others carrying leaves in a similar fashion. Each alighted on the bank, and after trying two or three of the holes with which the bank was tunnelled, entered one, which was about large enough to admit an ordinary-sized black-lead pencil. I managed to secure one of the carefully-carried leaves. It was of a long oval form, and was evidently intended by the bee for one of the sides of her cell.

In concluding this short paper, I will merely say that if any quiet person wants a quiet sensation, or a surfeited lepidopterist is thinking of a change, let him take up the study of bees, and I assure him his labours will be compensated by abundant interest. W. H. WARNER.

Standlake, Oxon.

MICROSCOPY.

THE LYMPH OF SMALL-POX.—Dr. Klein gave an account of his now well-known microscopical researches on the lymph of small-pox at a recent meeting of the Linnean Society. The virus resides in the solid particles of the lymph, and not in its fluid portion. These solid particles, he showed, were identical with the organisms (Schizomycetous fungi), called by Dr. Burdon-Sanderson *Micrococci.* They are likewise produced by the granules contained in their interior. Dr. Klein has produced the pocks on sheep by artificial inoculation of these germs. On examination of a pock produced in this manner, the *micrococci* were found in the lymphatic spaces which are formed in the skin at an early stage. They occur in masses or in mycoloid threads. At a later stage signs of fructification were observed, and conidia of a *penicillium*-like character were produced in the spaces. The same growth is found in the cavities of the pustules subsequently developed. Dr. Klein has also produced the disease by the injection of lymph directly into the vein. The pustules thus formed were quite the same as those produced by inoculation, and the sane *penicillium* growth was found in their interior. The paper was illustrated by various microscopical preparations, &c.

ANGULAR APERTURES.—At a recent meeting of the Microscopical Society, Mr. Henry Slack read a paper on the relation of angular aperture to surface-markings and accurate vision, in which he showed the fallacy of the present system of using high-angled objectives for these purposes, to the exclusion of those of small angular aperture, and pointed out that extreme angles were only to be obtained at the expense of accurate correction and penetrating power.

COPPER IN ANIMAL ORGANISMS.—MM. Bergeron and Hôte have recently conducted some interesting investigations on this subject. The livers and kidneys of fourteen human bodies were examined for copper. In two the presence of this metal could only be proved qualitatively, but in eleven others the quantities of copper ranged from 0·7 to one millegramme. In one individual, seventy-eight years old, the copper amounted to 1·5 millegramme. Great care was taken that copper was not introduced into the liquids tested for it. The above gentlemen think that copper constantly finds its way into the human body, in consequence of the daily use of copper vessels, coins, &c.; that the greater quantity of the metal is again eliminated from the system; but that a minute quantity is retained by the secretory organs, as the liver and kidneys, under any conditions of age or sex or mode of living.

STENTORS.—A short time ago I noticed several gelatinous-looking globules, from ⅛th to ¼th of an inch in diameter, attached to chara in a glass jar which had been standing in a sunny window for some weeks. I transferred one of them to a zoophyte-trough, and examined first with a pocket lens, and then with the microscope, when I found it to consist of an immense assemblage of stentors, apparently *Stentor polymorpha*, imbedded in a mass of dirty-looking jelly, evidently formed by the united exuviæ of the colony, and from the centre of which they radiated in all directions, with their ciliated mouths projected in quest of prey. The trough was placed on one side, and, on examining it on the following morning, I found the assemblage broken up, though the mass of viscous matter remained. The stentors were some of them swimming freely about, and others associated in groups of from half a dozen to twenty attached to a common centre by their basal disks, and already commencing a fresh deposit of exuvium. I have often kept stentors before, but never noticed their associating themselves in this way. Can any of your microscopical correspondents inform me whether it is a common occurrence?—*Edward Horsnaille, Dover.*

BERMUDA TRIPOLI.—At a meeting of the Boston Natural History Society, Mr. C. Stodder called the attention of the members to a note in SCIENCE-GOSSIP for May, 1864, on the locality of the celebrated "Bermuda Tripoli," signed "F. K.," in which the writer says that Mr. Geo. Norman, of Hull, "found that it came from Nottingham, Maryland." Mr. Stodder, supposing that its locality might be known to other observers independent of Mr. Norman, wrote to Professor Johnston, of Baltimore, who had supplied some of the members with the Nottingham deposit. Professor Johnston's reply is published in the current part of the *Monthly Microscopical Journal.* In this communication it will be seen that the writer was the actual discoverer of the identity of the Bermuda Tripoli with the deposit from Nottingham:—"I had resolved to visit Bermuda Hundreds (in Virginia) for the purpose of making an exploration, when, about the 1st of April (1860), my valued friend, P. T. Tyson, Esq., State Geologist of Maryland, sent me a number of small parcels of Tripoli which he had procured in different parts of the State. One of these, marked *Nottingham,* attracted my particular attention, for I had the extreme pleasure to find in it the diatomaceous forms familiar to my Bermuda Tripoli slide, beside a host of others; and I at once was satisfied that the lost Bermuda Tripoli was before me, and its locality discovered." Mr. Stodder remarks (and correctly) that Mr. Norman, in his paper in the *Quarterly Microscopical Journal* for January, 1861, does not say that the Bermuda came from Nottingham, as "F. K." represents, but only suggests the possibility of the case. This needs some little explanation on my part. When I wrote the reply to the inquiry, I had quite forgotten Mr. Norman's paper, and had only remembered various observations made in his letters written ten or twelve years ago. I have no doubt I too positively asserted Mr. Norman's conviction of the identity of the deposits. I can, however, add a little further evidence in favour of it. Amongst other microscopic material received from my old friend, Mr. Thos. Brightwell (of this city), just before his death, was a small packet marked "Tripoli Bermuda; same as sent to Ehrenberg. Professor Bailey." This was precisely the same as the Nottingham deposit both in its external appearance and diatomaceous contents. Unfortunately Prof. Bailey does not state the actual locality; probably not knowing it. The reason for the obscurity of the locality of this material is, perhaps, the following:—It is well known that many of the polishing powders are called "tripolis" (Ehrenberg calls many of the deposits polishing powders), and no doubt this particular deposit was an article of commerce in many of the Southern States of America. Professor Bailey happens to obtain some of it in or from Bermuda Hundreds, "and to distinguish it from other tripolis" marked it "*Tripoli Bermuda*."—*F. Kitton, Norwich.*

ZOOLOGY.

The Brighton Aquarium.—In a lecture on the Brighton Aquarium and what it has done for science, Mr. Wonfor, the curator of the Brighton Museum, said that one of the principal scientific gains was to confirm the observations that the roe of the cod tribe, as well as that of mackerel and other fish, was not deposited, as was previously believed, amongst sand and gravel at the bottom of the sea, but floated on the surface of the water during the whole period of its development. This was a most important fact, as it was a potent argument against a close time for deep-sea fishing, or for laws interdicting deep-sea trawling, while it cuts the ground from under the feet of those who urge upon the Legislature the necessity for a close time, and who affirm that very great injury is done to ova by the trawl-net.

The Manchester Aquarium.—W. Saville Kent describes in *Nature* a novel accession to the Manchester Aquarium in the shape of the so-called "Congo Snake" (*Murænopsis tridactyla*), from the neighbourhood of New Orleans. It is a singular eel-like animal, belonging to the Amphibia, and would be taken by an ordinary observer for a common eel. Its legs are almost rudimentary, and are furnished with three slender toes. They are used for slowly crawling at the bottom of the tank. It swims with great rapidity by means of undulations of its body. Its length is about two feet and a half, and its colour a slate-grey above and ash-colour beneath. It has to come to the surface to breathe at distant intervals, the air being drawn through the nostrils into a lung-pouch. Although reputed by the negroes to be venomous, it is perfectly harmless.

The Potato Beetle.—I scarcely feel certain that the recent steps taken by some of the European governments in relation to the importation of American potatoes have in view the exclusion of the potato beetle (*Doryophora 10-lineata*), but if so, the authorities must be ignorant of the habits of this insect. The prohibition of the importation of the tuber is an unnecessary and useless step, seeing that the beetle, in no stage of its existence, *ever attacks it!* The eggs are laid on the *leaves* or stalks of the plant in early summer, the larvæ feed on the leaves exclusively, and the pupa is formed in the ground. I see no reasonable ground of apprehension that this beetle will ever find its way to Europe at all; but if it does, it certainly will not be in a barrel of potatoes.—*W. V. Andrews, 36, Boerum Place, Brooklyn, U. S.*

The Snake-eating Snake.—In your issue of May 1st I observe a paragraph by Mr. Frank Buckland, quoted from *Land and Water*, wherein it is written with reference to the Snake-eating Snake, *Ophiophagus Elaps*, now in the Zoological Gardens: "The learned doctor [Fayrer] gives the only correct account of this creature's habits, especially that of his eating other snakes." This is not the case. The late Dr. Theodore Cantor, of the Bengal Medical Service, one of the best zoologists that ever went to India, discovered the snake in question, and most fully described him and his habits more than thirty years ago, under the name of *Hamadryas ophiophagus*, in the "Journal of the Asiatic Society of Bengal." I saw several specimens of this snake, both alive and preserved, in Dr. Cantor's possession, and assisted him, many a time and oft, in his dissections of, and experiments with, all kinds of serpents. I recollect that this species, although a veritable cannibal as regards his own race, by no means disdained other prey, and used to devour rats, mice, and small birds. I remember Cantor offering a bandicoot (*Mus giganteus*) on one occasion to a *Hamadryas* snake. The former showed fight, and the latter seemed to show the white feather; so the rat was knocked on the head, possibly thus saving the snake's life. The typical specimens of this fierce and rare reptile, with the whole of Dr. Cantor's splendid collection of zoological specimens, were presented by him, shortly before his lamented death, to the East-India Museum, where I presume they may now be seen. I think it but fair and due to the memory of a first-rate naturalist to set the reading public right, through your columns, especially as the *Ophiophagus*, long familiar to me and other observers in India, seems to be exciting a good deal of interest and attention at home.—*L. C. Stewart, Deputy Surgeon-General.*

The British Association Meeting. — This year's meeting commences at Bristol on the 25th of August, under the presidency of Sir John Hawkshaw, the celebrated engineer. It promises to be a very agreeable week. The local secretaries are making all the necessary, and we may say, extra arrangements. Excursions are fixed to visit Chepstow, Tintern Abbey, Salisbury, Stonehenge, Cheddar Cliffs and Caves, Glastonbury Abbey, Cadbury Camp, Bath, &c. A capital sketch-map of the district, showing all the places of interest, geological, archæological, and otherwise, has been sent to every old member of the association. The local secretaries are Messrs. W. Lant Carpenter and John H. Clarke.

Provincial Societies.—We have received the fourth and fifth Annual Reports of the Wellington College Natural Science Society. It is a record of good and useful work, containing botanical, entomological, and zoological lists of the local flora and fauna. The Yorkshire West Riding Naturalists' Society numbers some well-known names among their members, so that their excursions to places of interest both read well and chronicle interesting facts. One of them reports the nightingale this year as far north as Lumb and the neighbourhood of Almondbury. This fact is attested by competent ornithologists who have heard it.

Liverpool Literary and Philosophical Society.—This well-known society has just published, in a handsome and well-edited volume, the Proceedings of the sixty-third session. It includes the President's address (by Mr. A. J. Mott); a lecture by Dr. Carpenter, on "The Psychology of Belief"; a lecture by Sir S. Baker, on "The Past and Future of the Nile Basin"; a capital paper by Mr. Thomas Ward (accompanied with a map), on "The Great European Salt Deposits," with a theory as to their origin; besides other elaborate essays on historical, æsthetical, and general literary subjects. The volume concludes with a "Synopsis of an Arrangement of Invertebrate Animals" in the Liverpool Free Public Museum, with an introduction by the Rev. H. H. Higgins, M.A.

Bee-keeping. — We cordially recommend Mr. John Hunter's neat and compact "Manual of Bee-keeping" to those of our readers who delight in keeping this intelligent and useful insect. It is well printed and fully illustrated, and the price (half a crown) brings it within the reach of all. Mr. Hunter writes clearly and well, and is evidently an enthusiastic bee-keeper, and therefore, of course, desirous that others should be. The "Manual" is published by Hardwicke, 192, Piccadilly.

Star-fish, and how to Preserve them.—Lately dredging about ten miles off the mouth of the Dart, I got some very rare star-fishes. I have tried for many years to kill them before they dismember themselves, which they will do almost as soon as they come out of the water. I am happy to say I have succeeded at last, as follows:—The star-fishes, as soon as taken from the sea, must be placed directly in a large can of sea-water before they have time to throw off their members. They are safe now until you get home. When there, get a shallow dish, and pour in some spirits of salts, diluted with one-half cold water. Take the star-fishes out singly, and immerse them in the liquid quickly. It kills them instantly. Then place them in a dish of clean water. Directly after you will find the star-fishes quite perfect, and not dismembered if done quickly. Now place them on a flat piece of board (the underside uppermost) in the sun until nearly dry. Then turn them there, for a short time, repeatedly, and then let them remain until thoroughly dry. Sea-urchins can be killed instantly in the same way. They never move after immersion.—*A. J. R. Sclater, Teignmouth, Devon.*

BOTANY.

The Glastonbury Thorn.—As the Glastonbury Thorn seems to be creating some little interest, I have thought that the following remarks may be interesting to the readers of Science-Gossip. The ancient legend is so well known that it need not be repeated here. The original tree stood on an embankment on Weary-all Hill, and which is now known as the Sea-wall. It is here that St. Joseph is supposed to have landed, and planted the Thorn, or, as some say, his staff, "in Memoriam." This tree was cut down by a Protestant soldier of Charles I., as it was thought to be a relic of Popery. The original stump remained till about the year 1750. There are many thorns in the neighbourhood which claim to be offshoots of the original tree. The most authentic specimen is, perhaps, that which stands near St. John's Church, and which is said to have been planted about the year 1600. There is another in the grounds of Butleigh Court, and one, a young one, in the grounds of Glastonbury Abbey. I was not in the neighbourhood during Christmas-time, but I have it on the best authority that the tree at Butleigh Court was in flower on Christmas-day last, and I am also informed that it flowers again in May. I visited the tree at the Abbey early in February. The buds were then so far advanced as to show clearly the mode of inflorescence, but the leaves were not fully developed. On a subsequent visit in March I found the buds unaltered, but the leaves had so far advanced, as to be plainly distinguishable from *C. oxyacantha*, by their greater length, more cuneiform contour, and less pinnatifid form. The inflorescence of this species, which I believe is a native of the South of France, also differs in a very marked manner from that of our common type by the greater laxity of its corymb.—*A. C. H., Butleigh Vicarage, Glastonbury.*

Etymologies of Plants.—For the information of "W. G. P." I quote as under from Dr. Thornton's "British Flora" (1812). *Frankenia.*—"The classic name in honour of Frankenius, a Swede, professor of Botany in the University of Upsal, died in 1661." *Dianthus.*—"From *Dios* (G.), of Jupiter; *anthos* (G.), flower, the flower of Jupiter, from its extreme beauty." *Sagina.*—"From *sagina*, which means 'nutriment,' this plant being found in rich pastures, and eagerly sought after by sheep, which it is supposed to fatten much." *Illecebrum.*—"From *illecebra* (L.), 'blandishments,' so called from its enticing persons to venture upon bogs, where they get lost." *Knawel.*—"So called from its seeds requiring to be *knawed well*, well chewed; from its hardness, or from its roots themselves in difficult situations." *Elatine.*—"From *elate* (G.), a pine-tree, from its resemblance to one." *Hypericum.*—"From *uper* (G.), over, and *eikon* (G.), an image, or ghost, as being used as an amulet against spirits." "*Githago* appears to be from the Latin word *gith*, or *git*, a cockle, and the word cockle is from the Saxon *coccel*, a weed; hence the English name Corn-cockle (*Lychnis githago*) is equivalent to Corn-weed." I presume the "Deptford Pink" is so called, either from its growing plentifully near Deptford, or from its being first noticed there.—*J. B. Bradley, Dudley.*

Cytisus candicans.—The shrub recently referred to in Science-Gossip as the *Cytisus triflorus*, for which, not being then in flower, it was mistaken, is now in flower in Cliftonville Nursery, and turns out to be *Cytisus candicans* of De Candolle (*Genista candicans* of Linnæus); though naturalized about Pool Harbour, Dorsetshire, where it grows almost wild, in great abundance, self-sown, it is a plant of the Mediterranean region. The late severe winter has proved it to be one of the hardiest evergreens. The French Flora gives its height as from 3 feet to 6 or 7 feet; it is a free grower, and an ornamental shrub, with abundant yellow flowers in *lateral umbels*, somewhat like the greenhouse Coronilla. Mr. Baker, of Kew, says it is common in cultivation, but it has been hitherto unknown to the nurserymen in Brighton, where it is now about to be extensively cultivated.—*T. B. W., Brighton.*

Preserving Fungi.—Mr. J. H. Martin says that a good method for the preservation of fungi is to place them in a solution of 1 part of calcic chloride (chloride of lime) and 10 parts of hydric oxide (water). This will change the phosphates in the fungus into phosphate of lime, after which they will be found to keep well.

Albino Plants.—Last year I was much surprised to see among a quantity of the *Papaver Rhœas* one specimen of a pure white: it did not appear to be in any other way a monstrosity. *Orchis Morio*, which is not uncommon in this locality, varies from white with faint pink streak, on the sepals, to darkest purple. When in Carmarthenshire I was much pleased to find a large plant of *Calluna vulgaris* of the purest white, *Geranium Robertianum*, *Solanum dulcamara*, *Scilla nutans*, and *Campanula glomerata*, I have found in Northamptonshire white. *Digitalis purpurea* is frequently found white about Dunkeld. *Symphytum officinale* here is always white, but in Scotland the purple variety seemed the more common. Violets occur here white, white with the outer petals darkish blue, pink, light and dark blue; while primroses are notorious for their variability in colour. Polygala is uncommon in Northamptonshire, and varies but little in colour, while in Bedfordshire I have seen it in all shades.—*S. C. Druce.*

The "Dukery" and Sherwood Forest.—This is the title of a well got-up volume, published by Robert White, of Worksop, on the topographical, archæological, geological, botanical, and zoological features of this, one of the most charming places in Great Britain. It is well and clearly written, and equally well illustrated, and will, no doubt, be received by the public as the best guide to the district that has yet been issued. The botanical and entomological lists are full and accurate. The chapter (with lists) on the "Flora of Sherwood Forest" is written by Mr. John Bohler; the zoology by Mr. W. J. Sterland, a well-known naturalist; and the geology by Mr. C. T. Wright, F.G.S.

Norfolk and Norwich Naturalists' Society.—This flourishing society has just presented its members with Part I. of the second volume of *Transactions*. We are glad to note that it is in more vigorous health and activity than ever. It includes among its members some distinguished and well-known naturalists and botanists. Mr. T. E. Amyot has a paper on the "Winfarthing Oak" visited by the society last year, and a description of which has already appeared in our columns. Mr. H. G. Glasspoole contributes some biographical memoirs of several Norwich botanists; the hon. secretary, Mr. Thomas Southwell, F.Z.S., a paper on Mr. Marsham's "Indications of Spring"; the Earl of Kimberley, a list of "Birds observed on the Kimberley Estate since 1874"; Mr. C. G. Barrett, an essay on "The Wild Cattle at Chillingham"; and Mr. John Quinton, jun., a carefully-prepared series of notes on the meteorological observations recorded at Norwich during 1874. The part concludes with a lengthy and most valuable, carefully-arranged list of flowering plants known to occur in Norfolk, by Mr. H. D. Geldart, a well-known Norfolk botanist.

GEOLOGY.

Remarks upon Mr. Mallet's Theory of Volcanic Energy. By the Rev. O. Fisher, M.A., F.G.S.—Mr. Mallet's paper, read before the Royal Society in 1872, was discussed by the author *seriatim* as far as it seemed open to criticism. With respect to the condition of the earth's interior, whether it be rigid or not, Sir W. Thomson's arguments for rigidity were referred to, and geological difficulties in accepting his conclusions suggested. Mr. Mallet's views regarding the formation of oceanic and continental areas, that they have on the whole occupied nearly the same positions on the globe at all periods from the very first, were excepted to on the ground that all continental areas with which we are acquainted are formed of water-deposited rocks, and that therefore those areas must at some time have been sea-bottoms; and if these wide features have not occupied the same positions which they now do from the very first, Mr. Mallet's explanation fails, that they were caused by unequal contraction when the crust was first permanently formed and thin. It was also shown that the theory of unequal *radial* contraction cannot account for the difference of elevation between continental and oceanic areas upon reasonable assumptions. For if we consider the crust to have been 400 miles thick (which cannot be considered *thin*), and to have cooled from 4,000° F. to zero (a most extravagant supposition), then, if the crust had contracted one-tenth more beneath the oceanic area than it had done beneath the continental, we should only get a depression of one mile for the oceanic area, using Mr. Mallet's mean coefficient of contraction. The main feature of Mr. Mallet's theory was then discussed—viz., that "the heat, from which terrestrial volcanic energy is at present derived, is produced locally within the solid shell of our globe, by transformation of the mechanical work of compression or crushing of portions of that shell, which compressions and crushings are themselves produced by the more rapid contraction by cooling of the hotter material of the nucleus beneath that shell, and the consequent more or less free descent of the shell by gravitation, the vertical work of which is resolved into tangential pressures and motion within the shell." Mr. Mallet's mode of estimating the amount of heat derivable from crushing a cubic foot of rock was explained, and it was accepted as a postulate, that the heat developed by crushing one cubic foot of rock would be sufficient to fuse 0·108 of a cubic foot of rock; or, in other words, that it would require nearly the heat developable by crushing ten volumes to fuse one. Mr. Mallet considers that the heat so developed may be localized. But Mr. Fisher inquires why, since the work is distributed equally with the crushing, the heat should not be so also; and since no cause can be assigned why one portion of the crushed portion of rock should be heated more than the rest, assumes that all which is crushed must be heated equally. In short, he is of opinion that if Mr. Mallet's theory were true, the cubes experimented upon ought to have been themselves fused. After paying a just tribute of admiration to Mr. Mallet's elaborate and highly important experiments upon the fusion and subsequent contraction of slags, the author remarked upon Mr. Mallet's estimate of the probable contraction from cooling of the earth's dimensions, showing that it had been based on untenable assumptions. (The author of the paper, however, holds that the contraction of the dimensions of the globe has been greater than *mere* cooling will account for.) Upon the concluding portions of Mr. Mallet's paper, in which he estimates that the amount of energy afforded by the crushing of the solid crust would be sufficient to account for terrestrial vulcanicity, some strictures were made; but it was held that, if the main proposition had not been proved, these calculations were not of essential importance.

"On the Occurrence of 'Eozoon Canadense' at Côte St. Pierre."—This was the subject of a paper read at a late meeting of the Geological Society by Principal Dawson, of Canada. The author commenced by describing the arrangement and nature of the deposits containing *Eozoon* at the original locality of Côte St. Pierre, on the Ottawa river. The Eozoal limestone is a thick band between the two great belts of gneiss which here form the upper beds of the Lower Laurentian. *Eozoon* is abundant only in one bed about 4 feet thick; but occasional specimens and fragments occur throughout the band. The limestone contains bands and concretions of serpentine, and is traversed by veins of chrysolite; the former an original part of the deposit, the latter evidently of subsequent formation. A thin section, 5½ inches in depth, showed: —1. Limestone, with crystals of dolomite and fragments of *Eozoon;* 2. Fine-grained limestone, with granules of serpentine, casts of chamberlets of *Eozoon* and of small Foraminifera; 3. Limestone with dolomite, and containing a thin layer of serpentine; 4. Limestone and dolomite, with grains of serpentine and fragments of supplemental skeleton of *Eozoon;* 5. Crystallized dolomite, with a few fragments of *Eozoon* in the state of calcite; 6. Limestone containing serpentine, as No. 2. The author criticised some of the figures and statements put forward by Messrs. King and Rowney, and noticed two forms of *Eozoon,* which he proposed to regard as varieties, under the names of *minor* and *acervulina.* He stated that fragments of *Eozoon,* included in dolomitic limestones, have their canals filled with transparent dolomite, and sometimes in part with calcite. In one specimen a portion was entirely replaced by serpentine. The author called particular attention to the occurrence of serpentinous casts of chamberlets, single or arranged in groups, which resemble in form those of the Globigerine foraminifera. These may belong, either to separate organisms, or to the Acervuline layer of the *Eozoon;* the author proposes to call them *Archæospherinæ,* and describes them as having the form and mode of aggregation of *Globigerina,* with the proper wall of *Eozoon.* The author discussed the extant theories as to the nature of *Eozoon,* and maintained that only that of the infiltration of the cavities of foraminiferal structure with serpentine is admissible. He particularly referred to the resemblance of weathered masses of *Eozoon* to Stromatoporoid corals.

Fossil Frogs.—Professor Newberry, director of the geological survey of Ohio, has made additional collections in the coal-measures of new fossils. The vertebrate remains of land animals of carboniferous age have as yet only been found in Ohio, within the limits of the United States. These include thirty-three species of Batrachians, but no reptiles or higher vertebrata. One of the recent novelties is a species of the genus *Ceraterpeton,* the first time a European genus has been detected in America. It was as large as a rat, and had a pair of stout horns on the back of its head, in the position and having much the form of those of an ox. The skull is sculptured by rows of small pits, separated by fine radiating ridges.

Tertiary Trigonia.—This peculiar genus of bivalve shells, so abundant in the fossil state in the secondary rocks of Europe, and still abundant in the living state in Australian seas, has hitherto been remarkable for its apparent absence in the tertiary strata—an evident anomaly. Professor M'Coy, however, has just described a third species of *Trigonia* (having previously described two others from the tertiary formations near Melbourne). It was found associated with characteristic tertiary fossils near the Gippsburgh lakes. He names the species *Trigonia Howitti.*

NOTES AND QUERIES.

Contamination of an Aquarium.—I suspect "W. H. C.'s" aquarium (Science-Gossip, p. 47) is infested with a confervoid growth, which, when once introduced, is most difficult to eradicate. The germs usually arrive in some pond-water, or perhaps attached to a plant, and the increase is rapid, especially in mild weather. As "W. H. C." observes, removal of the living contents of the aquarium does not remedy the evil. You may run off the water, scour the sides and bottom of your aquarium, and wash carefully all objects before replacing them; but some animal or plant is almost sure to carry an unperceived fragment, which is sure to "increase and multiply." The only plan in such a case is to start *de novo.* Occasionally turbidity arises from the non-preservation of the equilibrium between the animal and vegetable existences in the aquarium. A slight amount of attention will remedy this. A lump or two of charcoal, judiciously hidden, helps to keep all pure. I have noticed that it is a very common error to crowd too many fish into an aquarium.—*J. R. S. C.*

Aphides and Honey-dew.—There has been much discussion as to the nature and the source of this peculiar dulcet compound. The November number of the *Entomologist* contains an interesting note showing that the recent observations of Dr. Hooker and Mr. Doubleday confirm a statement made by a naturalist a century ago, that there are two kinds of honey-dew, one exuded by the leaves or shoots of plants under certain conditions, and the other produced by aphides. In both, probably, the chemical composition is nearly similar, the aphides passing the sap through their digestive economy without producing much change therein, except it be that the saccharine matter is increased. —*J. R. S. C.*

Destruction of Ants.—To *extirpate* colonies of these is not so easy, but their numbers may be considerably reduced by Mr. Newman's plan, which consists in making a strong syrup of coarse sugar, and immersing pieces of string or rope in this. These are laid in the tracks, and when the ants swarm upon them they are taken up and plunged in boiling water.

Disease in Elm-trees.—There is a public walk on the bank of the river Taw planted on both sides with elm-trees. They were planted in 1812, and are about 30 feet high, and appeared very healthy until the last few years. About six years ago they began to die away, and have continued to do so with such rapidity that at the present time more than a quarter of them have been destroyed. They are first noticed to die away in the uppermost branches, and the decay gradually finds its way to the trunk. This is accomplished in about eight or nine months. Various suggestions have been made as to the cause of this, but no one here seems able to arrive at any definite conclusion. I herewith forward you a piece of bark taken from one of these trees: you will see that it is perfectly honeycombed by some insect. Do you think this has anything to do with the death of the tree? Can you tell me the name of the insect causing this? In the small box is a shell found in one of the holes: I thought it might better enable you to determine the species. How are the ova first deposited,—as the insect appears to eat its way directly from the centre of the tree?—*W. A.*

Do Fishes utter Sounds? — A great many fish do utter sounds. The conger will snap, and make a loud noise at the same time. The dory will give out a low moan and quick snort, particularly if it gets in rather shallow water, when it can be heard ten paces off. I have captured scores of blennies by hearing a clucking noise at the mouth of holes, where they generally spawn in the summer season. I should like your inquirers on the subject to judge for themselves by taking a few days' trip in a trawler, and seeing the variety of fish that is caught, and hearing the many different sounds that come from them; also from the crabs and other crustacea that the trawl-net brings up. I have just come ashore from such a trip, and have been greatly delighted with it.—*A. J. R. Sclater, Teignmouth, Devon.*

Cats and Music.—If "Musicus, Padiham," will turn back to p. 282 of Vol. V. of Science-Gossip, he will find an account (by my friend Mr. George Guyon) of a favourite cat of mine—now alas! no more; where he will see that his own cat is by no means unique in being affected in a particular way by music. By the bye, I do not know whether "Rode's Air" is a lively or plaintive tune, but only one of the latter kind affected my poor old "Brownie." I used, as a rule, to whistle "The Last Rose of Summer" when I wished her to perform. I never could satisfy myself as to her motive in putting her mouth to mine. The most feasible conjecture that I was able to make seemed to be that she imagined me to be in pain, and in some way tried either to soothe me or to stop my whistling.—*William Noble, Forest Lodge, Maresfield.*

Preserving Reptiles.—Can any reader kindly inform me of the proportion of water and spirits (methylated) suitable for preserving reptiles, or other specimens, and give hints for bottling, and rendering the bottles air-tight? Full particulars would oblige.—*A. C. Haddon.*

Query.—Can any one inform me where to obtain Nicholson's aniline dyes, alluded to in Dr. Beatty's paper on Staining Vegetable Tissues?—*W.H. B.*

Winter Quarters of Coccinellæ.—One day early in November, whilst taking a stroll, and stopping to admire the beauty and variety of the autumnal foliage, my eyes were attracted by a large and brilliant spot of red on some palings inclosing a wood in front of me. I at first imagined it was a fungus; but on closer scrutiny discovered it to be a number of ladybirds, *Coccinella septem-punctata*, congregated together. I could not see that they were doing anything but the *dolce far niente*,—in fact, they appeared to be in a semi-torpid state. I examined the palings for some distance, and wherever covered by lichen found the *coccinellæ* in more or less abundance, but could not detect a single specimen on any that were quite bare of it. It seemed to me that the lichen was to be their *hibernacula*. Although the larva is so voracious, destroying immense numbers of those pests, the *aphides*, the perfect insect seldom eats; indeed, I am not aware that its food is even known. It was a pretty contrast between the light green lichen and their showy scarlet coats.—*J. Anderson, Jun., Alresford, Hants.*

Viper-Fat.—Referring to a communication in your June number, I may state that viper-fat is a common remedy in this part. Only last week it is within my own knowledge that wounds on a child's neck caused by a cat's claws, and very severe ones, were healed in a few days by viper's fat which a neighbour gave from her store.—*South Devon Subscriber.*

Natural History in Novels.—Your correspondent "R. S. T." quotes from a novel, "Katefelte," and asks, is the passage "in accordance with the observations of any of your readers?" The effect mentioned can easily be produced in exactly the manner described. I have seen a row of fowls rendered quite senseless by drawing a chalk line (beginning at the top of the beak), slowly across a table. I have myself successfully performed the experiment. The birds are simply mesmerized. Men can be influenced in the same way by a similar process. I have by intently watching the receding light on the back of a railway carriage moving in a perfectly straight line, in a few seconds become so drowsy as to require a vigorous effort to shake off a sleep similar to that produced under the hands of a mesmerist. From the name of the work quoted I conclude the hero must be "Doctor" Katerfelto, an advertising quack who practised in London about 1782, mentioned by the poet Cowper in the "Task," and who travelled round the country exhibiting tricks of legerdemain, the marvels of the microscope, electrical experiments, &c., and, no doubt, included the mesmerism of fowls among his performances.——*W. C. H. B. Ives, Dalston.*

Death of Hedgehogs.—On April 23rd I purchased a hedgehog of a bird-fancier. On bringing it home and giving it some earthworms and milk it went to sleep in a rabbit-hutch plentifully supplied with fresh hay; each day its temperature became lower, and on the 29th it died. On May 28th another was purchased; after eating one worm soon went to sleep, and in seventeen hours died. Can any of your readers explain these early deaths? It could not be from starvation, for the first hedgehog refused to eat more. Do the vendors injure them when they deliver them to you?—*T. H. A.*

Herbarium.—Having read the article in Science-Gossip entitled "On Preserving Plants," I would suggest one improvement—that of securing the specimens to the paper by means of court-plaster, fastened to the under side of the specimen. I have quite a large herbarium, and have found this very satisfactory. By this arrangement all messing or tearing of specimens is avoided.—*Ida F. Pearson, Plainfield, N.J., U.S.A.*

Longevity of Toads.—Perhaps you noticed a short paragraph on the "Longevity of Toads," which appeared in a late number of the *Graphic*, to the effect that in digging up a garden near Orsay, some workmen unearthed two terra-cotta vases, which they at first supposed to contain treasure. On breaking them, however, two live toads were found clad in green velvet. This strange attire showed that they must be at least two hundred years old, as an ancient treatise on magic and demonology mentions that at the beginning of the seventeenth century sorcerers dressed up toads in this manner for the achievement of certain charms. The same treatise tells the fate of an unlucky citizen of Soissons, who baptized a toad which he had gaily caparisoned for the ceremony, and was burned alive for the sacrilege.—*F. J. Allan.*

Field Clubs and Rare Plants.—I inclose an example of a device (a botanical enigma) which we have recently used at the excursions of the Liverpool Naturalists' Field Club. The present enigma is, I think, an exceptionally easy one; but of the number who gave in the right plant several failed in accurately applying the descriptive terms to the proper characteristics of their specimens. Botanical prizes have been thought likely to promote the extirpation of rare plants. I believe that botanical localities are rarely injured by botanists; but as soon as any uncommon plant attains a market value, as in the case of the Killarney Fern, and perhaps also in that of the Lady's Slipper, its destruction is imminent. Intimately acquainted as I have been with the working of this club, in which prizes are freely offered, I have reason to believe with confidence that during our excursions for the last fifteen years not a solitary instance has occurred of a rare plant having been collected to an injurious extent in any locality by the members of the club. We form indeed a large party, but those amongst us who take an interest in any department of natural science, including geology, entomology, and botany, are comparatively few. We think that our prizes are to be commended, amongst other reasons, because they enable the club to distribute annually a considerable number of standard works on natural science amongst such of its members as will value and use them.—*Henry H. Higgins, President.*

Food of Death's-head Moth.—In answer to the query regarding the food of the larvæ of the Death's-head moth, I once had a fine one brought me feeding on the woody nightshade, or bittersweet (*Solanum Dulcamara*), which fed up into a pupa, but I did not succeed in rearing the moth.—*Matthew Henderson.*

A Dog and a Cat.—I have just been introduced to two automatons—Picini, the dog, about 6 lb. in weight, milk-white, black eyes and nose, long curly coat, breed Maltese. It was too beautiful not to attract my attention. We became friends. While this was going on, I saw a cat stretching itself on an arm-chair—a very beautiful creature, tabby, with rich black stripes. I got up to look at it. She was rather coy of a stranger. Picini followed me, looked up, head first on one side, then on the other. There was a glance of jealousy at me, then he sprung on the chair, and buried his little nose in pussy's neck. The cat's fore-paws embraced his neck, her hind legs embraced his body, and in that attitude the white dog and the glossy cat rolled over and over in play. When tired of that they stood on their hind legs for a moment, then fell into each other's arms, rolling about and playing, if not to their hearts' delight, certainly to mine. "What a lovely pair!" I remarked to the American lady, the owner. "That cat," she said, "has the most human face I ever saw in the felines. She has never been teased, never frightened; those two play together till they are weary, they lie down to sleep together, and awake to eat together. Automatons is a word used by those who will not comprehend those wondrous links that run through all nature, adapting all things to fill the place appointed for them. You see these two creatures in their natural characters," said the lady. The whole scene was simply delicious!—*H. P. Malet, Florence.*

Basalt.—In Science-Gossip, No. 114, you were good enough to publish my question, "What is Basalt?" In No. 117 M. F. W. Rudler was good enough to answer some of my queries, for which I am much obliged. But the main point remains where it was. Will you allow me to put the question before your readers in another form? In the *Athenæum*, No. 2,479, 1st May, 1875, in reference to the phosphates in sedimentary rocks, I find, "In fact, it appears that the most probable source is to be found in rocks of igneous origin." After saying "that phosphate of lime in the form of apatite" is found in such rocks, it is said that the phosphates are taken up from those rocks in decomposition by the soil, thence by plants and animals, and so on to sedimentary rocks. Allowing this latter progression, I want to know how phosphate of lime finds a source in igneous rocks. Fire makes nothing, but it alters many things. Lava is an altered rock, basalt may be; lava may be formed from granite, any other silicious rock or basalt. I ask the categorical question again, "What is Basalt?" Mr. Rudler touches on the subject of phosphates, and his letter in Science-Gossip is similar to the paper alluded to in the *Athenæum;* in fact, the pen seems the same. "The cycle of changes is complete"; but the cycle has no beginning. Will the question resolve into air and water?—*H. P. Malet.*

Experiment with a Cock.—I have not read the novel "Katerfeltoe"; but with reference to the description of an experiment, or trick, with a cock, extracted from it by "R. S. T., Surrey," I may tell him that such trick is a very old one; one that I have often performed, as a boy, more than twenty years ago, and have repeated within a relatively recent period for the amusement of my own boys. Placing the bird upon a table or board, and holding his wings close down to his sides, a second person must now bend down his head until his beak touches the board or table, and straight out from his beak draw a line of white chalk in front of him. This done, the person who has been holding the cock's wings may leave him straightway; he will not make the slightest effort to stir. Nay, further, you may clap your hands or shout close to him, without rousing him from his apparent lethargy, from which though, ultimately, he will recover. It is difficult to theorize on this very curious and striking effect. It has occurred to me that possibly the forced squinting of the bird at the chalk line may produce a very slight temporary congestion of the brain, and so hypnotize or mesmerize him. Upon this point, however, any one of your numerous medical readers would be able to give a more trustworthy opinion.—*William Noble, Forest Lodge, Maresfield.*

Communications Received up to 6th ult. from:—M. P. M.—J. R.—G. C. P.—G. V. D.—W. H. B.—J. H. P.—H. P. M.—J. E. S.—W. T.—H. D.—A. E. S.—T. B. W.—F. J. A.—H. M. J. U.—Mrs. R.—J. A. P.—W. R. B.—F. K.—C. M. M. L.—H. L. J.—H. H. H.—E. E. E.—Mrs. W.—J. A.—L. C. S.—J. H. A.—W. C. H. B.—S. D. S.—W. J. H.—J. P.—J. B. B—L. T.—J. A. A.—G. G.—J. T.—A. J. R. S.—A. C. H.—Capt. W. N.—J. F. R.—J. C.—H. L. J.—H. E. M.—G. H.—Dr. G. D. B.—W. E. S.—W. E. H.—H. J.—A. L.—C. P. H.—R. W.—W. B.—A. H.—H. P. M.—R. H. P.—J. W.—W. B.—M. T.—J. D. C.—G. R.—C. H. W., &c.

NOTICES TO CORRESPONDENTS.

Carices.—The name of the sender of the carices we received for naming has been mislaid. The following are the names of the plants:—E. *Carex glauca*; B. *C. curta*; A. *C. muricata*; D. *C. strigosa*; C. *C. riparia*.

W. R. B.—You will find a description of the geology and glaciers of Switzerland in Ball's "Alpine Guide," in three small 8vo. vols. (1. Western Alps; 2. Central Alps; 3. Eastern Alps); Professor J. D. Forbes' small book on the Alps (the large work is difficult to get), and Bonney's "Rambles in the Alps."

Rev. W. Eyre.—Your plant is the Bird-cherry, *Prunus Padus*, L.

A Student.—Your plant is the female of the small Marsh Valerian, *Valeriana dioica*. No white geranium ever received.

A. H. Lury.—The specimen is the Rough Hawksbeard, *Crepis biennis*.

W. Jennings.—Your specimen was very much withered, but it appears to be *Veronica agrestis*.

C. A. Day.—Your plant is evidently a species of *Banksia*.

A. Young.—The specimen is a variety of the Ground Ivy we have not seen before.

E. L M.—The Long-eared Owl (*Otus vulgaris*) is not uncommon in England in moderately wooded country. It is rather a silent bird, and strictly nocturnal. The American Owl referred to is a very different bird.—J.S.

G. Arnold.—Can the bird you describe be the Mistletoe Thrush, *Turdus viscivorus?*—J. S.

J. E. Sampson.—The insects sent us are the Field Cockroach, *Blatta Germanica*. It is regarded by some entomologists as indigenous, but it has a very wide distribution. You cannot do better than use white hellebore to get rid of them.

R. J. L —The malformation in the specimen sent (of *Ranunculus bulbosus*) is of very common occurrence. It is caused by the tissues of the young stems growing together so as to form a ribbon-like scape. Masters, in his "Vegetable Teratology," page 11, denominates this form of monstrosity "fasciation."

H. D.—The peculiar flower of pear is due to the conversion of the petals into true leaves, called "Phyllody of the corolla." We have never seen it in the flower of the Pear before.

G. G.—See answer above on "fasciation" of stem of *Ranunculus bulbosus*. Your specimen was similar.

T. R. Y.—Get Mrs. Lankester's "British Wild Flowers," with coloured plates, published by Hardwicke, 192, Piccadilly. Masters's "Botany for Beginners," Bradbury & Evans, will give you a capital idea of structure, &c.; then read Oliver's "Elementary Botany," Macmillan & Co. Spencer Thomson's "Walks and Wild Flowers," and Taylor's "Half-hours in the Green Lanes," Hardwicke, will also readily introduce you to all the commoner wild plants.

G. C. Pearce.—Your animal is one of the Rotifers, called *Melicerta ringens*, which makes a case of minute pellets. It has been frequently described.

John M. Pitcairn.—See article on "Collecting and Preserving Osteological Specimens," in the October number of Science-Gossip, 1874.

W. Thomas.—Your plant is *Genista anglica*. See references to easy botanical, &c., works, in other "answer" in this page.

Captain P.—We shall be delighted to receive any of your dredgings you may kindly send us.

Mrs. R.—Properly applied, a "gynophore" is the stalk of the ovary placed upon the calyx. Sometimes we meet with it in the Spurge family, though many of the fruits in this family are sessile, that is, sitting upon the calyx, or stalkless. We may in other words, say, when you meet with a stalk to the spurge fruit, if on or above the calyx, then it is a true gynophore (*Clerodendron Thomsonæ*, Balf).

Harriet McAllen.—The monstrosity in the sepals of the primrose forwarded is of the kind described by Dr. Masters in his "Vegetable Teratology" as phyllody, when the sepals or petals are transformed into leaves.

Waterside Plants.—The following are common:—*Rumex hydrolapathum*, *Alisma plantago*, various species of *Potamogeton*, *Veronica becca-bunga*, Water-cress, *Arundo phragmites*, *Lythrum Salicaria*, Willow-herbs, *Sagittaria sagittifolia*, *Cardamine amara*, *Caltha palustris*, &c. See Mrs. Lankester's "Common British Wild Flowers."

Mrs. Wright.—Science-Gossip is always published a few days before the beginning of the month whose name it bears. With the present number, however, we commence publication a week at least earlier than hitherto.

E. E. Evans.—Gold-fish may be purchased at any aquarium-dealer's,—say King's, Portland-road.

J. Atkinson.—Obtain Cooke's "Microscopic Fungi," with coloured plates, price 6s., to be had of Hardwicke, 192, Piccadilly, London.

EXCHANGES.

Notice.—Only one "Exchange" can be inserted at a time by the same individual. The maximum length (except for correspondents not residing in Great Britain) is *three* lines. Only objects of Natural History permitted. Notices must be legibly written, *in full*, as intended to be inserted.

Eggs of Gannet, Guillemot, Razorbill, Barn Owl, Whinchat, and others, for other good Eggs.—Address, John Platt, Shavington, Nantwich, Cheshire.

About 200 Birds' Eggs, including Gull, Guillemot, Nightjar, Jay, Queest, Jackdaw, Peewhit, Pheasant, Partridge, Butcher-bird, Finches, Larks, Tits, Buntings, Wagtails, &c. What offers?—E. Evans, Brimscombe, Stroud.

For a Leaf of Common Primrose, with Cluster-cups, send a stamped directed envelope and any unmounted object of interest to J. Turner, Davenport, Stockport.

Ranunculus parviflorus, *Adoxa moschatellina*, &c., for *Ranunculus philonotis*, *Gagea lutea*, or other Plants.—G. V. Druce, Northampton.

Wanted, a Lantern-Microscope, with Powers complete; oxy-hydrogen or oil. Slides of highest class Microscopic Objects, or rich Diatomaceous and Foraminiferous material in exchange.—Captain J. A. Perry, 42, Spellow-lane, Liverpool.

The 52 numbers of Appleton's Journal, weekly, year 1874, unbound, postage paid, for the 12 numbers of "Monthly Microscopical Journal," of same year, postage paid.—Address, C. M., care of Henry Taylor, Bookseller, Baltimore, Maryland, U.S.A.

British Plants.—Wanted, 4*a*, 6, 14*d*, 18*c-d*, 19, 63, 161*b-c*, 461, 520, 520*a*, 634, 638, 663, 747*b*, 1121, 1151, 1151*b*, 1208, 1212, 1221, 1224, 1226, 1266, 1367. Offered, 75, 125, 158, 253, 304, 305*b*, 306*b*, 328, 330, 335, 749, 835, 835*b*, 855, 887, 1001, 1338*b*, 1344, 1345, 1376, 1382, 1384.—James Cunnach, Helston, Cornwall.

Eggs of Moorhen, Partridge, Lapwing, Sedge Warbler, Starling, Missel Thrush, for others.—A. E. Shaw, 117, Hyde-park-road, Leeds.

Wanted, numbers 1415, 1416, 1417, 1418, 1432, 1435, 1440, 1444, 1445, 1446, 1449, 1456, 1457, 1471, 1478, 1422, 1437, 1451, 7th edition Lon. Cat.; offered, *Carex ornithopoda*.—J. Whitehead, 32, Brunswick street, Dukinfield.

Lychnis viscaria, for other rare plants.—H. Jones, 26, Victoria-street, Shrewsbury.

For living specimens of *Lymnæus*, *Paludina*, &c., suitable for an aquarium, send small box to Mrs. S., 34, Manchester-street, Notting-hill, W. Any local specimens of Moss, Fossils, or Shells acceptable.

Slides of various Fatty Acids, forming brilliant objects for the polariscope, and other good mounted Objects for exchange. —R. H. Philip, 28, Prospect-street, Hull.

Redi's "Insect Generation" (Latin, 1671, 48 plates), Swammerdam's "History of Insects" (Latin, 1685, 15 plates), for good Geological Guide to Essex and Suffolk.—A. L., 8, Melvern Cottages, Kentish Town, N.W.

For specimen of Sand from Memphis and the Pyramids send stamped addressed envelope and Object of Microscopical interest to A. Haward, 1, Shirley Villas, Addiscombe, Croydon.

BOOKS, &c. RECEIVED.

"Geological and Geographical Survey of Colorado, 1873." By Dr. Hayden.

"Vestiges of the Molten Globe." By W. L. Green. London: E. Stanford & Co.

"Life and Growth of Language." By W. D. Whitney. London: H. S. King & Co.

"Recreative Science." By Professor Page. London: W. Blackwood.

"Transactions of Norfolk and Norwich Naturalists' Society." Part 1, vol. ii.

"Monthly Journal of Education," June.

"Land and Water." June.

"Ben Brierley's Journal." June.

"American Naturalist." May.

"Canadian Entomologist." April.

"Boston Journal of Chemistry."

"Journal of Applied Science."

"Monthly Microscopical Journal."

"Report of the United States Commissioner of Agriculture for 1873."

A CHAPTER ON BONES.

By EDWARD FENTONE ELWIN, Caius College.

WHY is it that the students of Osteology are so few in number? It is a branch of science which offers a wide field for original research, and one in which at every step one's interest must get more and more engrossed. It is a branch of science in which a sufficient portion of its elements may be rapidly learned, in order to set the student fairly on his road. The barriers which surround it are few: that is to say, the *technical* barriers are few. Many people who want to occupy themselves with scientific study are deterred, because of the feeling that there are so many laborious preliminaries to be gone through before they can begin to take any real pleasure in the pursuit. Now, in Osteology it is true that a wide and really almost unexplored field lies open before one, but the equipments necessary to fit one for one's journey are easily attained. The first step, is to get thoroughly acquainted with some one typical specimen, as a standard of comparison for all future work. It matters little what species is taken; whatever one comes most convenient. Some familiar mammal of fair size is the best. The dog is as good as any, and easy to obtain. There never ought to be any real difficulty in getting a suitable specimen. If expense is no object, the simplest way is to get a preparation, set up so as readily to take to pieces, at one of the bone-preserver's shops in London. One like this costs only a moderate sum, and is, of course, the least trouble, although the manner in which professionals prepare their bones is not altogether satisfactory. But one may regard this something in the light of a luxury; and it is not hard to prepare one's own specimens, provided one does not mind a little manipulation with unsavoury objects. I have given hints as to the best method by which this may be done in previous pages of SCIENCE-GOSSIP.* Of course, as one's work gets on, one needs further specimens, but I do not think that any one who keeps his eyes open need be at a loss in this matter. I have picked up several admirable bones ready cleaned by the wind and weather, and many slightly-damaged ones may be got at naturalists' shops for small sums, which are almost as good as the perfect ones for an observer's purposes. Even single and isolated bones are often very instructive.

But the first main point is that of getting the forms, peculiarities, names, and positions of the bones of one skeleton fully impressed on the student's mind. As to the books which are to help him to do this, it is very hard to know what to recommend. As far as I know, there is no really luminous book on osteology in existence. So far as learning the names and peculiarities of the bones, nothing could be better or more to the purpose than Flower's "Osteology of the Mammalia"; but this treats only of one class, and does not get beyond technical description. The first and second volumes of Owen's "Comparative Anatomy of Vertebrates," fill the gap the best of any, and yet these are by no means what we really want. There is a good deal about bones in Huxley's "Anatomy of Vertebrated Animals," but in such a fragmentary and scattered form as to be of little use. The fact is, the field is yet open for an Osteological Manual. Much has been written on the subject. Pages of precise and accurate description, beautiful and artistic sheets of plates of bones without number can be seen in any scientific library. But this is only half the matter.

* SCIENCE-GOSSIP for 1872, p. 39; for 1874, p. 226.

We want to advance a step further. It is the relation between structure and function which needs working out.

When a new bone finds its way into the student's hands, he observes some peculiarity in shape or structure in which it differs from the bones he is already acquainted with, the question naturally occurs to him, Why does this bone assume one shape in one animal and in another is modified into a different form? He may look in vain in his books for an answer to his query. And yet it is points like these which, in my opinion, make up the true science of Osteology. It is through careful, constant, and intelligent observation, that these enigmas are to be solved. Observation, indoors and out; close attention to the habits of the animal in question, on the one hand, and careful consideration of its anatomical peculiarities, on the other.

Let me give an instance of this, first of all taking it as an axiom that everything has been done with a purpose. Take, then, the skull of a crocodile. What do we find? The orbits of the eyes, the nasal orifice, the passages leading to the auditory apparatus, all situated on a plane, along the upper flattened surface of the head. What, then, is the cause of this? Palpably, to allow the crocodile to remain submerged in the water, with its nose, eyes, and ears just above the surface to warn him of the approach of enemies or prey, and the rest of his carcass securely hidden beneath the waters.

Take another instance. Observe the habits of a mole. With what rapidity he burrows underground, shovelling away the earth with its fore feet. Then look at its skeleton. We find just what we should have expected. The bones of its fore legs of astounding strength and breadth, furnished with deep grooves, which, together with its sternum or breastbone, which is furnished with a keel almost like that of the sternum of a bird, afford attachment to the powerful muscles. Its hind legs, being simply needed for locomotion, are of the normal size. So, also, with the birds. The size of the keel of the sternum varies in proportion to the powers of flight which each species requires, for it is to the broad surfaces of the sternum that the great wing-muscles are attached. Take the skeleton of a humming-bird, which spends its life almost upon the wing. We find there a keel of so vast a size, that the remainder of the skeleton is reduced to insignificance in comparison. Of course, these instances that I have given are all of the most obvious nature, but they serve to show my meaning; and the same line of reasoning can, I am sure, be extended to all the more minute points in osteological structure.

In these researches, one is soon struck by the fact that in the modifications in various bones, or sets of bones, in accordance with the habits of each animal, the original type is never departed from, only modified. See, for example, the paddle of a whale. More like the fin of a fish in general appearance, and yet the same set of bones which are found in the arm of a man, are again found in an adapted form in the paddle of the whale. So, also, the fore leg of a horse preserves the same general plan. What is generally called his knee, is in reality his wrist. It is there that we find the little group of bones which form the carpus. All below it answers to our hand.—a hand consisting of one finger.

Take even a wider instance. Compare the arm of a man and the wing of a bird. Still greater adaptations have taken place, and yet the plan remains the same. We still find the clavicle or collar-bone, the scapula or shoulder-blade, the humerus, ulna, and radius, answering to the same bones of our arm, a small carpus or wrist, and finally the phalanges or fingers, simplified and lengthened and anchylosed to form but one series of bone, with the exception of a rudimentary thumb. It is not uncommon to find a rudimentary bone like this which in some allied species is fully developed. The leg of the horse again gives us a very striking example of this. There is, so to speak, only a single finger, but we find, one on each side of this single finger, two small bones, commonly known only as splint-bones. These are the rudimentary traces of the same finger-bones, which in the rhinoceros are fully developed.

Now Osteology abounds in wonderful forms of structure like these. It is a study pregnant with pleasurable results, and is a real profitable study, and one in which each fresh student may do real solid work. It is all the little facts observed by naturalists from time to time all over the world, which on being collected together form the nucleus of knowledge, for indeed all the scientific knowledge which we possess is little more than a nucleus, with which we are supplied. The mere collector of curious objects in no way furthers science. Plenty of people have amassed beautiful collections of insects interesting in their way, but of very transient interest if it goes no further. The collector possibly knows nothing at all of the wonderful internal structure of the animals he preserves. His insects are to him simply a mosaic; a collection of pretty works of art. So also the shell-collector, for I cannot call such a one as I describe a conchologist, has often I believe the most vague ideas of what kind of beasts they were who dwelt in the cases he so carefully treasures, and his collection is consequently of a dubious worth to him. Now, to those who study the anatomy of the mollusc as well as its shell, such a collection is full of the deepest interest. He has learnt from his dissections that the habits of every variety of mollusc are accompanied by a variety of structure, which occasions a variety in the shape of the case which envelops it. It all blends together, and forms a harmonious whole. With a real love for science, as doubtless some of these collectors have, one is sorry to see so much time and money wasted on a pursuit which in their hands yields no fruit of any worth. The work of the sheer collector can only be classed with that of the compiler of a stamp-album. Whereas, collections of natural objects combined with intelligent study, are invaluable and almost indispensable to the naturalist.

I have said this much with the view of trying to persuade some reader of SCIENCE-GOSSIP to take up with osteological research. More workers are what are needed; and I can assure any one who makes the attempt that he will feel himself amply rewarded for any labour he may undergo by the many pleasures which the pursuit cannot fail to result in.

THE ANATOMY OF THE LARVA OF THE CRANE-FLY (*continued*).

IN the January number of this periodical I described such portions of the anatomy of the above insect as I had then been able to make out. I purpose now to complete my work so far as the larva is concerned, by describing in order the muscular, respiratory, circulatory, and nervous systems, and those curious structures which Mr. Lowne speaks of as being first observed by Dr. Weismann in Germany, and called by him imaginal discs; and from which the head and thorax of the future fly are developed.

If the larva be opened by an incision down the centre of the back, the integuments pinned back, and the viscera removed, the muscles which clothe the inner surface of the skin will be exposed, and will be seen to consist of the following series lying parallel to and on each side of the ventral nervous cord, which occupies the centre of the preparation:—

1st, a narrow series of longitudinal muscles joining segment to segment, flanked successively by the following broader ones; viz., 2nd, a diagonal series of slightly-crossing muscles; 3rd, another longitudinal series; 4th, a combined longitudinal and transverse series, underlying the lateral bands of the integument; 5th, a third longitudinal series adjacent to the dorsal vessel. These divisions are very marked in the abdominal segments, but in the first three, or thoracic ones, the distinction is not clear. With regard to the fourth series, I think that the simultaneous contraction of the longitudinal and relaxation of the transverse muscles is chiefly instrumental in producing that swollen contracted condition which I have before alluded to, and for the assumption of which the structural arrangement of the overlying portions of the integument seems specially calculated to provide. I must not forget to mention that these muscles are, in general, two deep; consequently the superficial layer only is shown in the drawing, the deeper one (by which I mean that nearer to the skin) corresponds, however, in its general arrangement with that shown.

In addition to these there are other special muscles proper to the body (exclusive of those which, as forming the outer coat of the viscera, have been already described while treating of these organs); viz., 1st, a pair of long, thin muscles connecting the seventh and eighth and ninth segments, which lie one on each side of the dorsal vessel, and have broadened extremities; they are, I think, the means whereby the looped form which the creature sometimes suddenly assumes when handled is produced; 2nd, a pair of suspensory muscles, which arise near the junction of the third and fourth segments of the body, and are inserted on the lower part of the stomach; and, 3rd, another pair of a similar character, arising near the former, and inserted at the upper portion of the proventriculus.

The muscles of the head differ much in character from those of the body, for whilst the latter are nearly always attached to the integument at both ends, and are more or less of a uniform size throughout, the former are generally attached directly to the integument by one end only, and that by a broad, flat origin, from which they taper to their points of insertion, most frequently in internal processes connected with the movable organs of the mouth. The largest of these are the flexor muscles of the mandibles, which occupy a considerable portion of the cavity of the head, from the internal surface of which they take their origin: they are inserted in two broad, thin processes, connected with a projection on the inner side of the base of the mandible, and consist of six separate muscles, three inserted on the upper, and three on the lower surface of the process. External to these are the extensor muscles; they are much smaller than the flexors, and are inserted in a slender process outside the points of support upon which the mandible turns; their action is thus to draw these organs apart. Close beside these are other smaller muscles connected with the maxillæ.

The labrum has a single pair of small parallel muscles, which lie one on each side of the upper internal surface of the head. The labium has two pairs of muscles; one inserted into a pair of stout processes which bend upwards from the base of the mentum, and partially inclose the mouth, and another into a more slender pair, which are connected likewise with the mentum, but beneath. Both these pairs arise from the back of the head, and, I think, act respectively the part of levators and depressors of the mentum, the one raising that organ towards the labrum, and the other having a contrary effect.

The muscles of the head which are not connected with the trophi are as follows; viz.—1st, three small pairs, which arise from the upper internal surface of the head, and are inserted into the commencement of the œsophagus on its upper surface, and between which the nerves to be hereafter

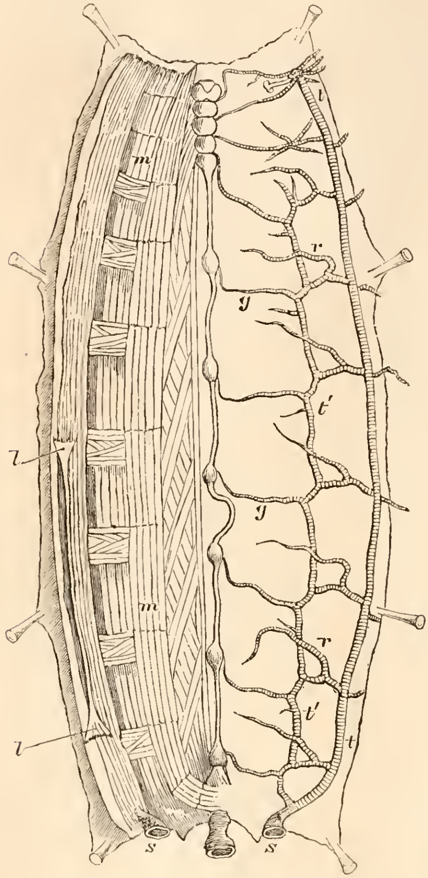


Fig. 107. General plan of the muscular and respiratory systems, showing, on the left hand at *m m*, the successive series of longitudinal, diagonal, and transverse muscles, and at *l l*, one of the looping muscles connecting the seventh, eighth, and ninth segments. In the centre is seen the ventral cord, and on the right hand one of the main tracheæ *t t*, together with its subsidiary trunk *t' t'*. At *s s* are the spiracles, at *r r* the offsets to the viscera, at *g g* those to the ganglia of the cord, slightly magnified.

described, which connect the frontal sympathetic ganglion with the brain, pass; 2nd, a pair of muscles which arise one on each side of the central internal ridge of the spur, and are also inserted into the upper surface of the œsophagus, shortly above the point where it passes through the brain. Between these muscles lies the funnel-shaped orifice of the dorsal vessel. I am inclined to think that the office of these muscles is in some way to control the supply of the circulating fluid through the latter organ; 3rd, another pair of muscles also arise from the back of the head, and appear to be inserted on the upper surface of the salivary duct, immediately below its commencement. I suspect these are the homologues of the pair of muscles mentioned by Mr. Lowne, as opening the valve of the salivary duct of the Blow-fly.* Between these I have some-

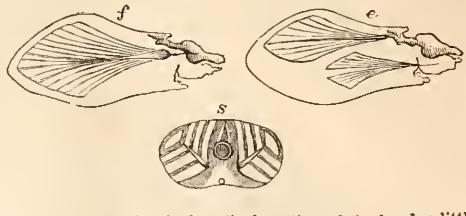


Fig. 108. *f*, Longitudinal vertical section of the head, a little to one side of the central line, showing the great flexor muscles of the mandibles, slightly magnified. *e*, Ditto further removed from the centre, showing the extensor muscles of the mandibles and those connected with the maxillæ. *s*, Transverse vertical section of the same, showing the œsophagus, the processes of the mandibles with the flexor muscles attached, and externally to these the extensor muscles.

times seen membranous curtains, with a free posterior edge.

The muscles of the body consist of flat bands or strips, varying from $\frac{1}{100}$ to $\frac{1}{50}$ of an inch across, each inclosed in a transparent membranous sheath,

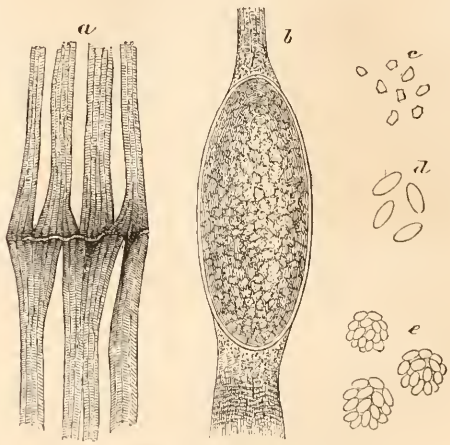


Fig. 109. *a*, Portions of two contiguous sets of muscles, showing their manner of junction, × 50. *b*, Portion of muscle undergoing destructive change × 120. *c d e*, Result of this change; *c*, as usually seen after the insect has been preserved in spirit; *d*, after treatment with liquor potassæ; *e*, in groups, × 350.

or myolemma.* It would thus appear that each strip must be regarded as a separate muscular fibre; they differ, however, from all other examples of muscular fibre with which I am acquainted, firstly, in their great size, and secondly in the fact that each fibre seems to form a separate and independent muscle.

* Lowne's "Anatomy of the Blow-fly," p. 52.

In young specimens and also in the pupa, I have observed the muscles, when torn from their connections, assume an almost cellular form, not to be seen in subsequent stages of growth, when the tissues take a more definite and permanent shape; as if indeed the myolemma and its inclosed fibre stood to each other in the relation of a cell and its contents, the latter being developed inside the former, and the former in its course of growth gradually altering its shape, and assuming the lengthened cylindrical form in which we subsequently find it.

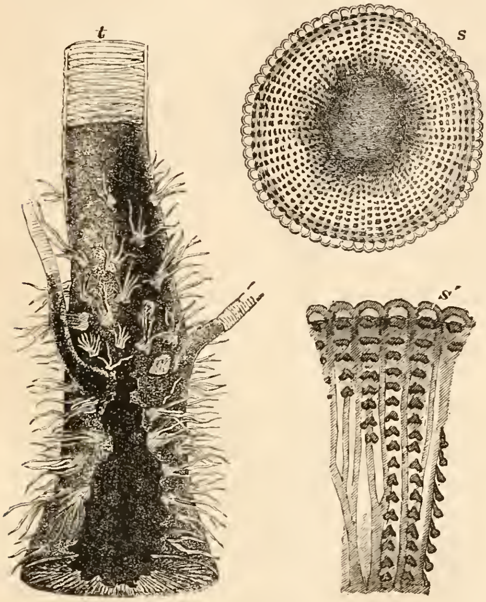
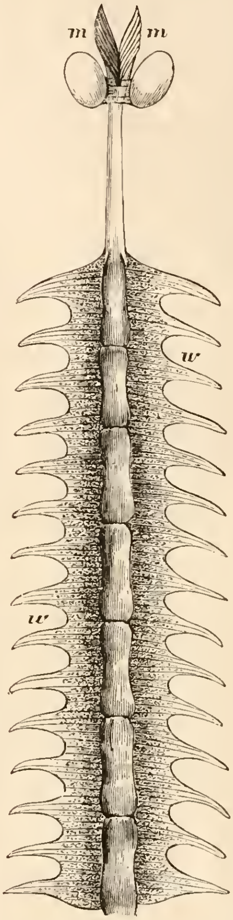


Fig. 110. *t*, Commencement of one of the main tracheæ, showing the origin of the two first branches and of the tubules. The broken portion shows the perforations through which the tubules issue × 50; *s*, the spiracle × 50; *s'*, ditto a portion more highly magnified × 210.

Where the muscles of two contiguous segments meet, their terminations dovetail into one another as if from mutual pressure. In some specimens I have noticed a very curious destructive change occurring in the muscles. A cellular cavity, small at first, forms in the substance of the fibre, and gradually increasing in size, it swells up and eventually bursts the myolemma. These cavities are filled with minute bodies, apparently formed at the expense of the muscular substance thus destroyed, and are subsequently found in every part of the perivisceral cavity. When the insect has been preserved in spirit, these bodies are slightly angular from mutual pressure, but upon treating them with liquor potassæ they assume an oval shape. In some cases I have found them aggregated into spherical clusters, as shown in the drawing.

I do not know what significance to attach to this change. I think it probable that it is analogous to the process of degeneration described by Mr. Lowne as occurring in the muscles of the larva of the Blow-fly after it ceases to feed,* and therefore



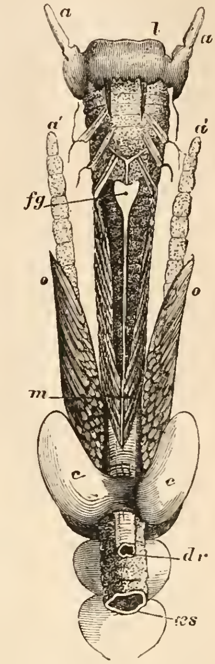


Fig. 112.

Fig. 113.

Fig. 111. The dorsal vessel, showing its passage through the brain, the muscles which guard its orifice at *m m* and the wings at *w w*.

Fig. 112. The œsophagus and parts attached; *l l*, the labrum; *a a*, the antennæ; *a' a'*, the antennal imaginal discs; *o o*, the optic discs. Between these are seen the œsophagus, the muscles which enclose the orifice of the dorsal vessel at *m*, and the frontal sympathetic ganglion at *fg*. *c c* are the lobes of the cerebrum; *dr* and *œs*, the continuation of the dorsal vessel and the œsophagus below the brain.

Fig. 113. Transverse section of dorsal vessel and wings; *dr*, dorsal vessel; *w w*, wings.

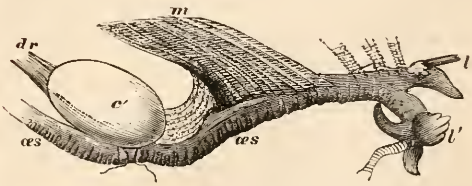


Fig. 114. Elevation of parts shown in fig. 112.

* Lowne's "Anatomy of the Blow-fly," p. 119.

associated with the approaching assumption of the pupa state; but I have not as yet been able to satisfy myself that the larvæ in which I observed it were in a more advanced condition than others in which I saw it not. I hope perhaps to have some future opportunity of satisfying myself on this point.

The organs of respiration consist, as in other insects, of ringed tubes called tracheæ, opening on the surface of the body, and ramifying over the muscles and viscera, &c., their finer terminations being distributed to every portion of the organism. The spiracles, which are the openings of these tubes, are in general placed along the thoracic and abdominal segments on each side; but in the larvæ of the Diptera this arrangement is, I believe, not followed; and in the present case two spiracles only exist, which are found in what I take to be the last segment of the body. From these spiracles two main trunks arise, which traverse the whole length of the creature on its upper or dorsal surface. In each of the abdominal segments two branches are given off from each main trunk; the smaller or dorsal branch on each side joins with its fellow of the opposite side, in the central line of the back, between the dorsal vessel and the skin, from whence a few smaller ramifications are given off. The larger or ventral branches in each segment, after sending each an offset to the viscera, subdivide, one branch passing forwards and the other backwards, to join those in the contiguous segments; thus forming a sort of subsidiary trunk, from which two branches in each segment are distributed to the muscles, the larger of which following the course of the nerves, ends by ramifying over the ganglia and ventral cord, between the nervous substance and its outer coat.

The distribution of the tracheæ in the thoracic segments is exceptional. The secondary trunk ceases with the eighth pair of branches (reckoning these backwards from the spiracle), beyond which we find only one more offset, No. 9, from the main trunk, previous to its final break-up into a number of branches, two of which pass into the head, and others, together with those from the ninth offset just mentioned, proceed to the thoracic ganglia, the imaginal discs, and the muscles of this portion of the body. One of these terminal branches is remarkable for the absence of the usual rings in its wall; it ends in the superior prothoracic imaginal disc, which corresponds, I believe, in the imago, with the anterior thoracic spiracle. The tracheæ appear to consist of an internal and external wall, in the former of which the ringed structure is developed. Between the two is a space, more or less considerable, varying I believe according to the condition of the insect with reference to a moult. This space appears to be occupied with formative matter in a viscid condition, and so interspersed with vacuoles, or clear oval spaces, as to give the impression that it is undergoing differentiation into a cellular structure. I have frequently seen the remains of a cast-off tracheal tube inside the new one; at other times this duplication, from the still perfect condition of the inner tube, induces me to think that it has not yet been detached, but that the outer one is in course of formation around it, its constituents being probably derived from the viscid protoplasmic matter by which it is surrounded. The five terminations of the tracheæ are destitute of the rings, and at certain points, as at the commencement and terminations of the main trunks, the ringed structure is replaced by a sort of felt, of exceedingly minute and closely-matted hairs. This is especially the case for some little distance from the spiracles, where also a new feature becomes strikingly noticeable; the walls of the tube at this portion being pierced with a great number of small pores or openings, from which issue very short tubes, which immediately split up into minute tufts of very fine tubules, in which, as usual, the ringed structure is absent. These tubules occupy a considerable space, and under a low power look like a mass of white cotton thread: some of them pass into the appendages by which the spiracles are surrounded. I am inclined to think that this may be a special provision for the more effectual aëration of the circulating fluid, previous to its passage through the dorsal vessel to the important organs of the head, especially as the absence of anterior spiracles might seem to countenance the supposition that the function of respiration in these parts might otherwise be ill provided for.

The spiracles are fair samples of that wonderful perfection and finish which so frequently excites the astonishment and delight of the microscopic inquirer in the field of insect anatomy. They consist of a central horny plate, from which radiate a great number of branching processes, connecting it with the circumference, like the spokes of a wheel. These processes are only clearly visible from the inside, as externally they are beset with rows of very minute knobbed and slightly forked hairs pointing in a sloping direction towards the centre of the spiracle in a plane perpendicular to its surface. The whole is surrounded by a beautiful ornamental edging, the great number and regular setting of the knobbed hairs rendering it a very attractive object for the cabinet, when properly cleaned and mounted in balsam for that purpose.

No closed system of arteries and veins exists in insects, as in the higher division of the animal kingdom, the circulation of their nutritive fluids, as is well known, being effected by a single pulsating vessel, which runs along the centre of the back immediately beneath the integument. This vessel is divided into a number of chambers, and Burmeister* describes these as furnished with valves

* Shuckhard's Translation, 1836, pp. 154 and 155.

and lateral openings. I cannot satisfy myself, however, of the existence of either of these in the present instance.

The chambers, which are seven in number in the abdominal segments, seem, on the contrary, to be separated only by slight constrictions of the wall of the vessel, which is closely connected, on its upper surface, with the integument, and on its lower with a flat membranous expansion which flanks it on either side, and is there prolonged into a series of triangular points. These are affixed between the muscles of the lateral bands, and are called by Burmeister "wings of the heart": they number about two pairs to every chamber, and present indication of a muscular character, in the striated fibrillæ which traverse them. Their office appears to be to dilate the dorsal vessel by pulling the lower portion of its wall from the upper, as will be understood by the sectional drawing I have given, the subsequent constriction being effected by the elasticity and slightly muscular character of the walls themselves.

The dilatation takes place not simultaneously along the whole length of the vessel, but progressively, the wings in the vicinity of the anus being the first to contract and dilate their portion; and afterwards those nearer the head in succession. Thus a wave of dilatation is constantly passing along the vessel in a forward direction, from the tail to the head of the larva, sufficient, I think, to account for the forward motion of its contents, without the presence of valves between the chambers, which, as I have before said, I cannot detect.

The dorsal vessel is destitute of wings or chambers in the three anterior or thoracic segments, which it traverses as a membranous tube, and passing through the œsophageal nervous ring, immediately above the œsophagus, it terminates by a funnel-shaped opening in front of the brain, between the two muscles previously described. I am somewhat inclined to think that in the membranous expansions of the wings of the heart we have only another form of the myolemma surrounding the muscular fibres of the body; that they are, in fact, true muscles, each inclosed in a separate cellular envelope, or myolemma, the muscular fibrillæ being very sparsely developed. A great number of oval cells filled with granular contents, beset the bases of the wings close to the dorsal vessel, and frequently impede exact observations on its structure.

(*To be continued.*)

A PAIR of live Sea-lions (*Otaria ursina*), male and female, have just been added to the collection of animals in the Jardin d'Acclimatation, Paris. They have been brought from the North Pacific, and now live in a large tank specially prepared for them. They are said to be in excellent health.

THE CEYLON JACKAL.

(*Canis aureus.*)

AMONG the carnivora of Ceylon, of which there are at present about twenty species identified, the most numerous, and best known by its cunning and adroitness, is the jackal (*Canis aureus*). With the exception of the very hilly country, it is to be met with in all parts of the island, hunting in packs and headed by a leader. From my own observation and experience of the habits and retreats of these animals, I certainly think that they partition the jungles which they inhabit into districts, each apportioned to a separate pack, by whom it is jealously guarded from the encroachments of all intruders. During the day they are comparatively inactive, keeping on the confines of the wood, in the depths of which they find concealment and shade, and from which they emerge only at twilight, to go their usual rounds in search of prey, at which time they utter the unearthly cry peculiar to their race, which mostly resembles the sounds *oikkay-okky-oikky*! very loudly and rapidly repeated. There is a mournful silence in the calmness of the evening, when the tropical sun sinks upon the horizon—a conviction that man has left the region undisturbed to its wild tenants. No hum of distant voices; no rumbling of busy wheels meets the ear; and in the wilderness, pathless and untrodden by the foot of civilization, where no sound is ever heard but that of the elements, when the thunder rolls among the towering forest, or the wind howls along the plains, one is suddenly startled by the harsh cry of the jackal, made doubly loud by the surrounding silence, which sounds very remarkable in the stillness and solitude of the night, and is well calculated to awaken peculiar emotions. Sometimes they wend their way towards the rivers and tanks, and wait in ambush for the different species of deer, which are compelled to resort thither to quench their thirst; when they are very soon assaulted and torn to pieces by these audacious prowlers. In the more northerly portions of the island, which mostly consist of wide plains, thinly covered with brushwood, diversified at intervals by little patches of jungle, jackals are to be found in regular swarms. The great scarcity of hares in this district, elsewhere abundant, is ascribed to their depredations.

In their hunting expeditions they especially display, in a high degree, their superior faculties of instinct and cunning. Towards nightfall, having marked the retreat of some small animal to its sleeping quarters, they all surround it, taking the precaution, however, to station a few to watch in ambush on the track by which the unconscious prey entered. The attack is generally commenced by the leader, for on raising his horrible cry, as the word of command, the whole pack then rush into the jungle and drive out the victim, which in most cases tries to escape by the way it entered, and thus falls into the snare previously laid for it. I have been informed by natives, who have had every opportunity of watching the movements of these animals, that when they attack a hare, or some such animal, in an open space or Patena, where there is no brushwood or jungle, they surround it, thus forming a regular circle; then raising their loud and continued cries and with incessant restless leaps, they go round and round, narrowing their circles each time, with their eyes fixed upon their victim, which at last, exhausted with terror and stupefied by their movements, makes no exertion to escape, and falls an easy prey to their voracity. But, in addition to minor and ignoble prey, the jackal rests under the imputation of attacking and bringing down the elk (*Rusa Aristotelis*), an animal of about 5 ft. in height, stoutly built, and endowed with very strong and swift limbs, in fact, it much resembles the red deer of Scotland in appearance.

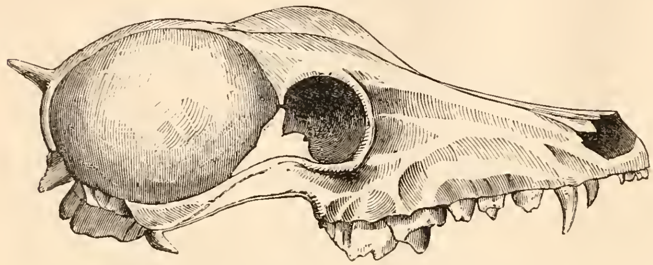


Fig. 115. Skull of Ceylon Jackal (*Canis aureus*), showing horn.

Jackals, like most other carnivora, when they are met with in single numbers, are very timid and cowardly, always shunning the presence of man, never voluntarily intruding upon his domains, and making a very hasty retreat when perceived. But, however, when they roam in packs and are pressed by hunger, they get very bold indeed, and instances have occurred of their entering houses at night, being attracted by the smell of food. An uncle of mine, who was living in a place infested by these animals, went through the following adventure, which well illustrates that they will even attack man when he is in a helpless condition. One very hot evening, having thrown himself on an easy-chair which was standing in the verandah of the house, he fell asleep; at 10 o'clock, however, feeling something cold and slimy touching his face, he woke up and, to his inexpressible horror, found he was surrounded on all sides by jackals, which had been licking his face and pawing him, evidently to ascertain if he was dead or not. The predicament was certainly not a very pleasant one. The first thing that entered his mind in the agitation of the moment was to stand up and wave his hands about, in the hope of scaring them away. But not a bit of it; it only served to excite them all the more; with tails and ears erect, at the same time uttering a low, growling, and hissing sound, they scampered round about him in a most hostile manner. It was only by a stealthy retreat to an adjoining room, where he locked himself in, that he effected his escape and left the jackals outside to contemplate upon the sad loss of their *would-be* meal.

Though strictly nocturnal in their habits, jackals are to be met with in broad daylight, not in packs, but only one or two stragglers; at which time they make destructive forays on the poultry of the villagers, which are generally allowed to wander about and pick up what they can. On one occasion I was watching some fine large turkeys that were feeding just in the vicinity of our house, when a jackal sprang out of an adjoining thicket, and carried off one of the turkeys. On being pursued it was wonderful to witness how rapidly it got along with its weighty prey, almost as large as itself, keeping very close in cover, and rarely venturing out in the open. It is said that they are subject to hydrophobia, and that cattle die in consequence of being bitten by them. Is it not more probable that the death of the cattle may be attributed to neglect and exposure in a moist and variable climate, especially as the natives do not think it expedient to afford them any cover at night, than to the bite of a jackal?* Instances in Ceylon have often occurred in the case of the jackal, which show to a great extent that indiscriminate suckling of the young of one animal by the parent of another; their affection in this particular is undoubted, but whether it exceeds that of any other animals I am not able to state. This, so far from being an evidence of parental attachment individually, is, I think, somewhat inconsistent with the existence of such a passion to any extraordinary degree. White, in his "Natural History of Selborne," speaking of a leveret having been nursed by a cat, whose kittens had been recently drowned, states that "this strange affection was probably occasioned by those tender maternal feelings which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from procuring her teats to be drawn, which were too much distended with milk, till from habit she became as much delighted

* At my departure from the island in 1871 a native discovered and captured two young jackals, and left in their place a couple of pups, which the mother nursed and brought up to maturity, so that in all probability there will be a race of wild dogs.

with this foundling as if it had been her real offspring." The head of some jackals is rendered remarkable by the existence of a strange osseous process on the super occipital, in the shape of a small cone, about an inch or sometimes an inch and a half, in length, and hidden from view by a tuft of bristly hair. It is a general belief that it is only to be found on the head of the leader of a pack, and, as far as I can understand, is strictly confined to the male sex. Amongst the superstitious natives there is a belief that certain charms are efficacious in protecting them and their property from different evils; thus they are accustomed always to carry a talisman, either tied round their arms or enveloped in the folds of their long hair. They regard the "jackal's horn" as the best talisman that could be had, and think its fortunate possessor becomes invincible in every lawsuit, and must irresistibly triumph over every opponent, and that by its instrumentality he could command the realization of every wish. So that whenever any jackals are shot, they are always examined, to ascertain whether they possess the precious horn, or *narric-combor*, as it is called by the natives. Whatever may be the supposed or real use of this horn, it would be very interesting to know; also why it should be confined to so few individuals, others not having the slightest trace of it.—*C. P. Hall, Woolwich.*

THE NORTHERN HOLY-GRASS.

(*Hierochloe borealis.*)

IN the volume of SCIENCE-GOSSIP for the year 1873, page 139, I was much interested in reading a few remarks made by R. W. Westward, Wigton, upon *Hierochloe borealis*, Northern Holy-grass, and have been seeking from that time to obtain specimens of this rare grass.

My desire was abundantly gratified about a fortnight since through the persevering endeavours and search of a kind scientific friend living at Wick, N.B., who, after much trouble, has obtained some beautiful specimens for me of the *H. borealis*, which were gathered from the banks of the river Thurso. I now inclose three of them for you, also a sketch of the grass, which I venture to accompany with a few particulars respecting it, hoping that perhaps they may not be uninteresting to some of your numerous readers, as I do not find any other reference made in the ten volumes of SCIENCE-GOSSIP to the Holy-grass except that by R. W. Westward, who in his paper wishes to know its time of flowering. Bentham, Lindley, and Moore speak of *Hierochloe borealis* as only being found, in Britain, "near Thurso, in Caithness, where it was first detected by Mr. R. Dick"; while Babington and Withering speak of it as being found in a narrow mountain valley called Thella or Cully, near the Spittal of Glenshe, in Forfarshire. Withering calls it Angus-shire. The Holy-grass was discovered there by Mr. Don, but has not been met with there I believe since: it was called by Linnæus the *Holcus odoratus*.

Fig. 116. Northern Holy-grass (*Hierochloe borealis*).

This grass is a perennial, from ¾ to 1½ foot high, with a creeping root-stock and flat leaves, usually short. It has loose spreading or narrow crowded panicles about two inches long, with slender branches. Spikelets ovate, of a shining brown, the outer glumes very pointed, near three lines long, and glabrous. Two lower flowering glumes attain the length of the outer one, but are rough on the outside with short hairs, each inclosing a three-nerved palea and three stamens. Upper flowering glume smaller and nearly glabrous, inclosing a still smaller one-nerved palea (or glume), two stamens, and the "pistil," which are "hermaphrodite," which means that both stamens and pistil are present and *perfect* at the same time.

This is an extremely rare grass: its scent is sweet, like that of our vernal grass, and it takes its English familiar name from the uses to which it is applied in some parts of the Prussian dominions, where the plant is dedicated to the Virgin Mary, and strewn in the aisles of churches, and around the doorways on festival days. It grows in abundance in Iceland, and there, as in other parts of northern Europe, it is laid in bundles among linen, or hung up in rooms, for its fragrance. Its odour is also believed to cause sleep, and in Sweden it is sold in bundles for this purpose. The Northern Holy-grass grows in mountain pastures and waste places, at high latitudes in northern and Arctic Europe, Asia, and America, descending southwards to Northern Germany, and to the mountains of South-eastern Germany, reappearing in New Zealand. Its locality in Britain I have previously mentioned. Its time of flowering is, according to Bentham, in the summer. Withering and Hayward name only May and June. If I may presume to give an opinion of my own, from the character of the grass, I should say Bentham was the more correct as regards the time in which the *Hierochloe borealis* flowers.

Dec., 1874. E. Edwards.

HOLIDAY RAMBLES.

No. VI.—The Scotch Arran.

"WHAT shall be our route to-morrow?" said I to my companion, as we were resting above the falls at Inversnaid, enjoying the view of Loch Lomond after a delightful day's ramble amongst the finest of Scotch scenery. Botanically the Trosachs are not so peculiarly interesting, but we had gathered on Ben Ledi the fragrant *Gymnadenia conopsea*, *Habenaria chlorantha*, *Orchis latifolia* and *incarnata*, some beautiful purple *Viola lutea*, and at higher elevations the English "Edelweiss" (*Antennaria dioica*). In boggy spots the Lancashire asphodel (*Narthecium ossifragrum*), *Saxifraga Aizoides*, and *Eriophorum* were very abundant. The pretty *Polygonum viviparum* and *Gentiana campestris* were not uncommon. *Thalictrum alpinum* was scarce. On the low hills around the juniper was very abundant. A little hut near Loch Vennachar was covered with the graceful *Corydalis claviculata;* and the banks of the Loch, as in most other Scotch ones, were thickly fringed by the *Epilobium angustifolium* and *Iris Pseud-Acorus.* In the Trosachs *Myrrhis odorata* and a small specimen of *Hypericum Androsæmum* were gathered, and *Vaccinum uliginosum* (?) was found growing on the lower heights of Ben A'an.

The beautifully varied foliage in the Trosachs, and on the borders of Loch Katrine, could not fail to excite admiration. The day had been extremely fine and clear, and the magic beauty of the scenery made the journey across the lake most enjoyable. The walk from the lake to Inversnaid, though to the mere tourist rather uninteresting, will well repay the botanist. The road lies through a boggy district, filled in many places with the showy *Comarum palustre* and the fragrant *Myrica Gale. Pedicularis palustris* and *sylvatica*, *Triglochin palustre*, and *Ranunculus flammula* were all gathered, and the *Drosera* and *Pinguicula* were very common. Great tracts of *Erica tetralix*, here the prevailing heath, rising out of beds of *Sphagnum*, formed an extremely beautiful sight. After pleasant refreshment at Inversnaid with some transatlantic cousins, a visit to Rob Roy's Cave was paid; but this was brought to a summary conclusion by the merciless midges. Close by Inversnaid were growing the *Meum athamanticum*, and splendid specimens of the *Polypodium Oreopteris*, *Dryopteris*, and *Phegopteris*, and in a rocky nook a fine plant of *Asplenium viride.* We sat and discussed the ascent of Ben Lomond, a day in Glasgow, or a look at Menteith. Then we thought that Bentham or Hooker said that *Ajuga pyramidalis* grew in Arran, and something about *Helianthemum canum* crossed our mind. We knew that Anderson spoke well of the Struey cliffs, and got rapturous over the geological formation of the island; so at length we arranged to investigate Arran. The following day was occupied in seeing Loch Lomond, and in getting to Arran *viâ* Ardrossan. The sun was setting when we entered Brodick Bay, and most lovely were the corries and the pointed rocks of Goatfell steeped in its rays. The appearance of the deep purple mountains, the green bay, and opalescent coast resembled an exaggerated chromolith more than a real British island. The following morning we spent in seeing Brodick grounds and Glen Rosa, the habitat of *Pyrus pinnatifida.* The glen abounds with ferns, while the beach yields *Silene maritima, Centunculus minima, Aster Tripolium*, and *Brassica monensis.*

The ascent of Goatfell we deferred till the morrow, and started over to Lamlash through a district covered with *Erica tetralix, cinerea,* and *vulgaris; Geranium sylvaticum* fringed the brooks; *Pinguicula vulgaris* and *Drosera* and *Hydrocotyle* were bordering the streamlets; on the dry commons *Jasione montana* was plentiful, and on the sandy shores of Lamlash *Rosa spinosissima* was freely growing; on Holy Island, opposite the bay, *Arctostaphylos uva-ursi* was common—at least, so we were informed. The walk home by the coast proved productive, *Glaux maritima* being plentiful, while the high cliffs, in which were diagonal rifts, yielded fine specimens of *Cotyledon Umbilicus* and *Allium ursinum*. Among the *débris* at the base of the cliffs, moist with the water trickling from above, the beautiful *Parnassia palustris* grew in plenty, and nearer Brodick the little *Pinguicula lusitanica* appeared, like its larger brother, having insects adhering to it. Large beds of *Iris Pseud-Acorus* filled the more swampy parts, which also yielded some good carices. *Cochlearia anglica*, *Triglochlin maritimum*, and *Samolus Valerandi* were frequent, and hanging down the cliffs were some magnificent specimens of *Hypericum Androsæmum; Œnanthe crocata*, and *fistulosa* grew near the cliffs. *Armeria vulgaris* was very common. It was a most delightful evening, and sitting in the grounds of the Douglas we watched the lovely tints gathering again round Goatfell, while the sea lay so placid and still, reflecting with lake-like preciseness the cliffs and houses of Brodick. Our specimens, however, did not include *Helianthemum* or *Ajuga*, and so we concluded we had not looked close enough, or that we had come to the *wrong* Arran; for was there not a rock somewhere in Galway Bay designated by a similar name? Well, even if we had made a mistake, we felt grateful to the idea that had caused us to come to the Scotch Arran. The sky promised well for the morrow and the ascent of Goatfell; "ower well," one might have said, as in the morning on looking out of window to the mountain, the window seemed of ground glass, or else had altered its position, so strangely circumscribed had become the view. Rolling clouds of mist going by explained the matter, the weather, with its usual capriciousness, having gone in for a change. So we were obliged to leave the island without ascending its highest point, and therefore started off "to fresh scenes and pastures new."

G. C. Druce.

OUR COMMON BRITISH FOSSILS, AND WHERE TO FIND THEM.

No. II.

By J. E. Taylor, F.L.S., F.G.S., etc.

Of the many thousands of species of fossils which have been found in the rocks of Great Britain, from the most ancient to the most recent, no group so well distinguishes a formation as that popularly termed *Graptolites*. They are peculiar to the Cambrian and Silurian systems, and have not hitherto been found elsewhere; being most abundant, however, in the Lower Silurians. Wherever Lower Silurian rocks have been explored, if they have been unmetamorphosed, so that the fossil remains have not been obliterated, *Graptolites* have been generally found in large numbers. Not unfrequently they are so abundant as to form a kind of carbonaceous matter in the rocks where they are inclosed. Their geographical distribution is exceedingly great, and, as they mark a geological horizon, no other group of fossils is more valuable in enabling us to arrive at the age of the rock-system where they are found.

To the palæontologist, and zoologist also, the *Graptolites* are unusually interesting, on account of their resemblance to, and yet marked deviation in structure from, a well-known and widely-distributed living group of marine objects. Moreover, even among the *Graptolites* themselves, there is a striking differentiation; a "differencing," however, which has, nevertheless, a foundation of resemblance to start from. More papers have been written about the *Graptolites* than any other fossils, not even excepting *Trilobites* and *Ammonites*, and not a few angry spirits have come to wordy blows about them! This difference of opinion has arisen from the endeavour to stretch or expand palæontological facts so as to fit into the natural history scheme we have formed for the purpose of classifying and arranging *recent* animals. Now that the theory of evolution is gaining ground among our best naturalists, let us hope that its first Christian effect will be to remove all accessory causes of "bad blood," by pointing out that, however perfect our existing scheme of classification may be for living forms, it is unphilosophical to expect that it will fit with equal accuracy those of long bygone periods, when animals frequently possessed characters that since then have been divided among different genera. Indeed, it would appear as if the *Graptolites* were, in some respects, a class of those "missing links" connecting two great divisions of animal life now distinct from each other.

The young geological student finds himself in no small degree perplexed when he first endeavours to find out the zoological relations of the *Graptolites*. Page refers part of them to the true "Sea-pens" (*Pennatula* and *Virgularia*), with which, however, they have nothing in common, except the mere external resemblance between the double *Graptolites* and them. The *Pennatulidæ* are nearly related to those familiar objects of our coasts popularly called "Dead Men's Fingers" (*Alcyonium digitatum*). Other writers place the *Graptolites* among the *Polyzoa*, or "Sea-mats." They are now, however, regarded as undoubtedly *Hydrozoa*, and very nearly related to those "Sea-firs" (*Sertulariæ*), which any observer may find grouped in diminutive groves on the outer surfaces of old oyster-shells in any fishmonger's shop. They differ from the Sertularians in some marked particulars; among others, in the possession of characters which cause Professor Allman, the great authority on the *Hydrozoa*, to regard them as intermediate between *Hydrozoa* and *Rhizopoda*.

In the "Sea-firs" (fig. 117), we have a horny stem, hollow throughout, giving off branches, like a miniature tree. These branches are also hollow, and communicate with small cups called *Hydrothecæ*. In each of the latter a distinct zoophyte lives, capable of putting forth its fringe of tentacles

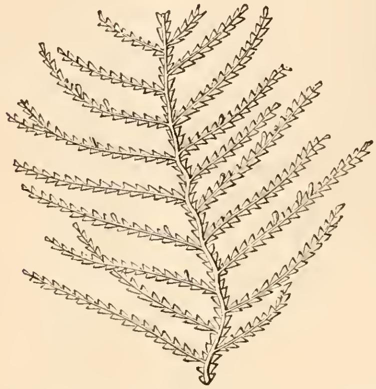


Fig. 117. Common Sea-fir (*Sertularia abietina*).

beyond the rim, and of withdrawing them again. Each individual is connected by means of the simple fleshly tissue (*cœnosarc*) which fills the hollow stems and branches, with every other on the same colony or polypidom. At the base of each of

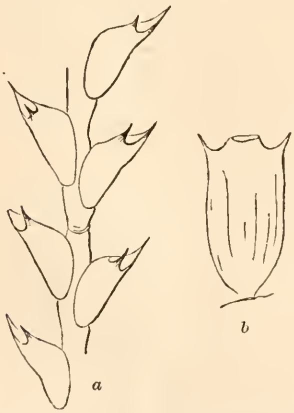


Fig. 118. *Sertularia cupressina* magnified; *a*, calycles; *b*, gonotheca or generative capsule.

the small cups is a partition, just separating the individual zoophytes. The horny matter, it must be remembered, is secreted by the soft, simple flesh (*cœnosarc*). At certain times there will be borne on the branches horny capsules, much larger than usual. These are the *gonothecæ*, for the special purpose of reproduction; the young ova issue hence as little free-swimming animals; some of them to assume during their wandering life—and before they settle down to bud and produce a "Sea-fir" colony—the appearance, and partly, also, the structure, of jelly-fish.

Fig. 119. Magnified calycles and capsule of common Sea-fir (*Sertularia abietina*).

Now, in many respects, the *Graptolites* resembled the modern *Sertularians*. First, they were composed of a similar horny or *chitinous* external substance, which, indeed, is all that is left of them in the fossil state, just as the entangled masses of "sea-firs" so often picked up along the coast and mistaken for seaweeds, are all that is left of the

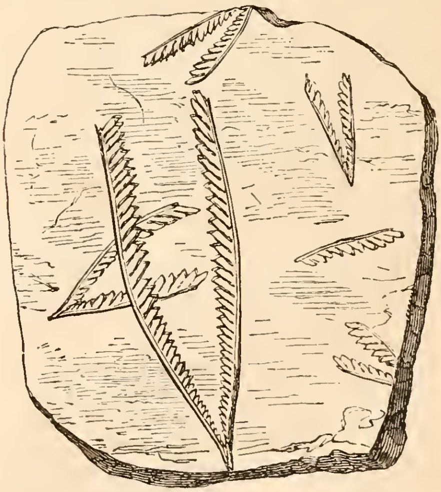


Fig. 120. Double Graptolite (*Didymograpsus Murchisoniæ*).
Fig. 121. Calycles of ditto, magnified.

living colony of which they formed the more solid and endurable parts. The *Graptolites*, also, were like the *Sertularians* in being compound animals, or rather, a colony of simple, *hydra*-like creatures; whence the name of *Hydroida*. In the *Graptolites*, however, the horny cups are crowded closely together, so that they are all in contact (fig. 121), whereas in the modern *Sertularians* they are distinct. In one genus of *Graptolites*, however, the cups are separate, and from the resemblance they have to the teeth of a rake (L. *raster*, "a rake"), these forms go by the name of *Rastrites* (fig. 123). The latter are usually coiled up like toothed watch-springs, and they are among the prettiest of all the *Graptolites*. Their resemblance to the brass-toothed wheels of watches is often still further borne out by the *Rastrites* having had their substance converted into iron pyrites, the gilt outlines standing forth in very bright relief from the surfaces of the black shales in which they are imbedded.

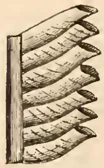


Fig. 121. Calycles of ditto, magnified.

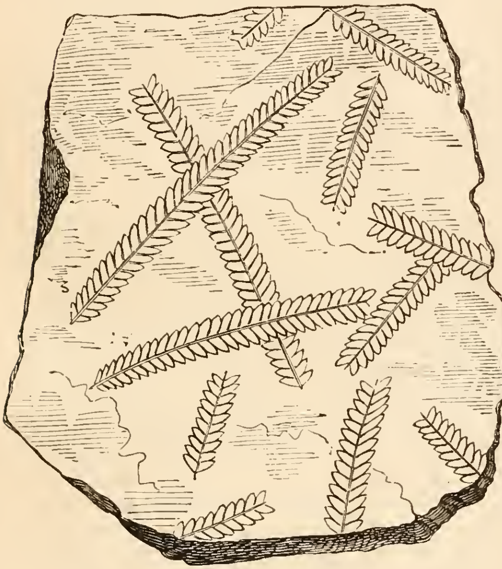


Fig. 122. Double Graptolite (*Diplograpsus pristis*).

These toothed projections, seen on the outer margins of both single and double *Graptolites* alike, are regarded by most naturalists as identical with the cups of recent "Sea-firs," or Sertularians, and therefore as having contained zoophytes when the *Graptolites* were alive. Professor Allman, however, doubts whether the *Graptolites* had any cups at all, and thinks that these projections were like those to be seen on the embryonic stem of the lobster's horn coralline (*Antennularia*), which bear *nematophores*. Dr. Nicholson figures the egg-bearing capsules of *Graptolites* in his "Manual of Palæontology," and his "Monograph of the *Graptolidæ*," where he sets forth their resemblance to the *gonothecæ* of the Sertularians. He states that he found them both attached to the branches of the *Graptolites*, and separate, and has no doubt as to their being the egg-bearing cases of the ancient *Graptolites*. Neither Allman nor Carruthers, however, assents to this conclusion. The former believes that the *Graptolites* did not bear egg-cases at all, but developed themselves by budding, just as the banks of that oceanic sea-weed called *Sargassum* are formed. In the possession of the cups, perhaps filled with protoplasmic matter, called *nematophores*, Professor Allman thinks the *Graptolites* were nearly related to rhizopod animals, and thus included characters now belonging to two well-marked groups of marine animals.

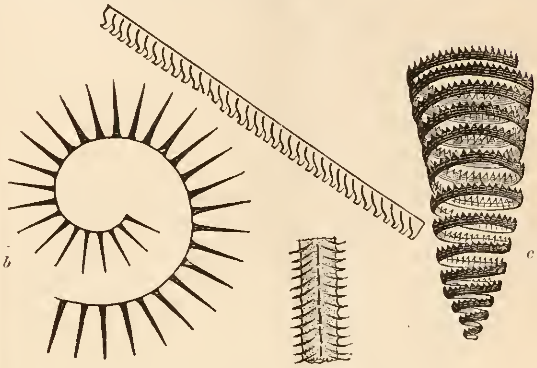


Fig. 123. Group of Graptolites; *b*, pastrites.

All naturalists are agreed that the *Graptolites* differed from the "Sea-firs" in not being rooted, as the latter always are. They were therefore free, and no doubt gathered in great banks, as would appear from the usual way in which they are found fossilized. So far, their development by budding, after the manner of the *Sargassum*, or "Gulf-weed," would appear to be probable. Mr. John Hopkinson has shown that *Graptolites* are capable of being grouped into two great divisions, in one of which a fibrous rod strengthened the outside of the single *Graptolites*, or was in the centre in the doubled species. This rod, Nicholson thinks, was originally hollow, and filled in with living material. It must not be confounded, however, with the hollow space (*cœnosarc*) communicating with each cup, which was undoubtedly filled with the "common flesh." The *Graptolites*, which possessed these rods are called *Rhabdophores*: all of them were free and unrooted. But there is another group of *Graptolites* of more complex structure, often branched and "dendroid," or "tree-shaped," like the Sertularians. These are termed *Cladophora*, and Mr. Hopkinson has

Fig. 124. Single Graptolite (*Graptolithus priodon*).

shown that they were fixed or rooted, like the "Sea-firs," and therefore very similar to them.

The reader will perceive the nature of the discussion, which has terminated in so many opinions as to the true natural-history relations of these interesting fossils, and will undoubtedly arrive at the conclusion that their nearest living allies are the "Corallines," or "Sea-firs" (*Sertulariæ*), although they had strong affinities with a group of animals even lower in organization than the latter, namely, the Rhizopods.

Carruthers has published a "Revision" of these fossils, in which the leading types are grouped as follows, beginning with *Rastrites:*—In this genus the polypary consists of a simple, slender, hair-like tube, from which project a series of detached cups (*hydrothecæ*). 2. The old genus, which was named by Linnæus *Graptolithus*. This has given the popular name to the entire group. In it the polypary is simple, and the cups are so thickly grouped along one side that they are all in contact with one another (fig. 124). 3. The genus named *Cyrtograpsus* by Mr. Carruthers, in which the polypary grows in one direction, and gives off simple or compound branches at intervals. 4. The genus *Didymograpsus;* in this we have, as it were, a double graptolite, of a forked shape, with the cups arranged within the fork (fig. 120). The geometrical forms assumed by the coupled branches, or polyparies, are various in different species. 5. *Dichograpsus;* a branched, and therefore possibly a rooted, genus of Graptolites. 6. *Cladograpsus;* another compound, or branched, sessile genus. In this the branches often give rise to other irregular branches, the first part of the name signifying a branch. 7. *Dendrograpsus* is another "tree-shaped," and therefore compound-rooted, sertularian-like graptolite, with a thick main stem. 8. *Diplograpsus* (fig. 122); in this the cups are arranged on each side the axis, so as to present the appearance of two simple *Graptolites* being placed back to back. 9. *Climatograpsus;* a genus so named by Professor Hall, of America, in which the polypary has a double series of cells hollowed out of the outer covering. 10. Lastly, we have *Dicranograpsus;* having double rows of cells in the lower part, with branches possessed of only single rows of cups or cells in the lower part, with only single rows of cells in the upper.

In the Arenig rocks of Ramsey Island, the branched forms seem to be tolerably abundant, and Mr. Hopkinson has shown that these have a nearer relation to the species of Graptolites from Quebec than any other found in Great Britain. Many of the species are branched. The branched or double form of Graptolite seems to be peculiar to the Lower Silurian rocks; whilst the fewer species met with in the upper strata are usually of a simpler character. Some compound forms seem to have attained great length; thus, a species of *Pleurograpsus* has been traced, over 3 feet long, although even this does not seem to have been the full size. The Skiddaw slates were formerly believed to form the lowest horizon where the *Graptolites* were met with, but Mr. Hopkinson's discovery of them, lower down in the Arenig rocks, not only extends their antiquity, but, owing to the similarity of type between the Arenig species and those from Quebec, suggests that their geographical distribution into colonies occurred later on through the subsequent geological changes which took place.

Doubtless, one of the very best hunting-grounds for British *Graptolites* is Dumfriesshire. That county is largely underlaid by Lower Silurian rocks, deposited along the floors of ancient seas, as so much marine mud. Little did the numerous Graptolites know that they were forming no insignificant part in laying down the foundations of the "Land of brown heath and shaggy wood"; a land to be uplifted for ages above sea-levels; on which the storms and atmospherical action of thousands of centuries should be expended, until its surface had become carved into hill and dale, lake and valley, gorge and glen, over all of which genius should throw the halo of ever-enduring romance! This wild land teems with as many relics of the semi-barbarous mediæval human period as it does with primeval fossils. The heroes, not only of Scott, but of many an unchronicled feud and deed of daring, have sought shelter in glens and linns where the black shales through which these had been cut were crowded with pyritized *Graptolites*. At Lockerbie, for instance,—famous for its "Lockerbie lick," in reference to the part it took in the old Border feuds and forays,—the black shales of the Lower Silurian rocks abound with these interesting fossils. Owing to the softish nature of the shales, and the way in which they allow water to ooze through their joints, many of the glens in them are well-wooded, and rich in flowering plants. In the shales at Lockerbie the pretty double Graptolite *Diplograpsus latus*, as well as *D. pristis* and *D. rectangularis*, are very abundant, the latter species particularly so.

The neighbourhood of Moffat, also, is good ground for Graptolites. Many new species have been recently described from this district. At Hart Fell we have such forms as *Diplograpsus pristis*, *D. tertiusculus*, *D. mucronatus*, *Didymograpsus flaccidus*, *D. sextans*, and many other commoner forms. In this well-wooded region, rendered classic by Burns and Hogg, the geological student cannot cast his eyes in any direction without recognizing some kind of geological agency or another. All the hills hereabout show traces of glacier action, in rounding striæ, or otherwise. Burns's "Craigieburn Wood" lies itself in the heart of the graptolitic shales, whilst the student of Scott's "Redgauntlet" will hardly fail to recognize the graphic scenery delineated in that novel, in his additional wanderings after fossils. Hart Fell is, indeed, one of the best places in Dumfriesshire for Graptolites of all kinds. Glenkiln Burn is another equally good hunting-ground, where, perhaps, the largest specimens of *Pleurograpsus* are to be unearthed. Garple Linn, Duff-Kinnel Burn, and Dob's Linn, are other rich storehouses of Graptolites. The latter spot is a waterfall sacred to the memory of two Covenanters, who are said to have been much annoyed by Satan. It is very certain that if these two worthy Scots had been looking for Graptolites, they would not have been troubled by such a personage!

Burns's own county of Ayrshire is not without various geological attractions, although the scenic features are not on so grand a scale as elsewhere. In the metamorphosed Lower Silurian slates of Cairn Ryan we meet with abundance of *Diplograpsus pristis*. Nearer home, this fossil is very abundant in the black shales which crop out in the basement of the little gorge on the top of the hill just above Lowwood, on the eastern shores of Windermere, and not more than a couple of miles from Ambleside. It is found on almost every piece of shale, in company with *Rastrites*, *Graptolithus*, &c., all of them beautifully pyritized. From the base of the gorge where these fossils are to be hammered out in any degree of abundance, you gain a magnificent view of Windermere, set in its rich framework of green woods, greener than we have seen arboreal vegetation anywhere else in Great Britain! The geological eye takes in the rounded rocks which lie outside the woody belt, and does not pass by the heaps of morainic matter which frequently form the eastern coast-line. Ice-action speaks forth plainly from every part of this district.

Of course, the Lower Silurian rocks, so well developed in North Wales, are not in many places bad Graptolite stores. In the black, slaty shales which crop out in the banks of the Seriont, opposite Carnarvon, the young collector may find sufficient to satisfy all his cravings. In various places around Welshpool, as at Eflyrnwy, near Llanfair, the flagstones abound in Graptolites, especially in *Graptolites Murchisoniæ*, and also *Graptolites latus*. In the slate-quarries of Llansantfraid, Denbighshire, the geological tourist may find *Diplograpsus pristis* in great numbers, associated with other familiar species. In the black shales which crop out in many places near Builth, and in the bed of the Wye, the above species and *Graptolites latus* are in great profusion. It will be seen, therefore, that in South Wales, as well as the north of the Principality, wherever the Lower Silurian rocks are well developed, and especially where the shales have a black, finely-laminated appearance, Graptolites may be looked for with every prospect of their discovery. Their very localities, the spots where the shales usually crop out, are to be sought amid the prettiest and loveliest bits of hill and mountain scenery. Nature holds forth charms of her own to tempt the student from the busy haunts of men to the quietest and most subduing parts of her sanctuary, where alone does she deign to unfold the mysteries that were originally hidden for him when "the foundations of the earth were laid."

THE NATTERJACK IN BERKSHIRE.

On p. 62 of this journal for 1874 I recorded my discovery of "a colony of Natterjacks" in Berkshire; and last Thursday (June 17th), though removed to another county, and some miles distant, I determined to pay the quarry a visit. This I accordingly did, and with very good success, as the sequel will show. The quarry has evidently been allowed to remain undisturbed of late, and is now nearly covered with a dense growth of different kinds of plants, among which the beautiful little Cinnabar Moth (*E. Jacobœa*) fluttered weakly on the day in question. Though no botanist, I could not help noticing a very fine specimen of that curious sickly-smelling plant, the Henbane (*H. niger*), flowering freely near a heap of stones. Then over the pools flew and rustled some splendid specimens of dragon-flies. But the reptiles were a sight in themselves. Clustered at the edge of the biggest pool was a semicircular mass, which I found consisted of an immense number of tadpoles of the common Toad (*Bufo vulgaris*), some with legs, and some without, together with a large assortment of tiny toads in their complete form. Thousands of the latter were also piled and heaped on the sand close to the pool. Some of these I found had not yet dropped their tails.

Continuing my search, I soon came across four partly-grown Natterjacks (*Bufo calamita*) crawling rapidly among the grass. They were rather better than an inch in length. Doubtless these small Natterjacks were spawned last year. Natterjacks being thus evidently about, I once more searched the pools, and soon discovered a large and brightly-coloured specimen, sitting with its head above the water, and its fore-feet resting on the weeds. The Natterjack in the water is a much more beautiful reptile than the dusty Natterjack on land.

Having a call to make in the neighbourhood, I now left the quarry, but did not forget to pay another visit as I came back. My success in the quarry this time being rather limited, I strolled on to the heath. Noticing two large slabs of stone (locally called "planks") lying on the turf, and thinking that I might possibly find beetles underneath, I raised one and started back in amazement; for in burrows horizontally winding under the stone were no less than seven full-sized Natterjacks. The burrows were just sufficiently wide and deep to accommodate the reptiles. The creatures had undoubtedly made these burrows themselves, and here they were quietly crouching. On the roof of their dwelling being taken off, they began moving directly, some insinuating themselves under the reversed stone, and others moving off altogether. Raising the adjoining stone rather nervously, I was again astonished; for, behold, under that crouched seven other Natterjacks; but these, instead of being adults, were exact counterparts of those I had found wandering among the grass. These little Natterjacks had also hollowed out winding burrows, suited to their size, under the stone, and, like the larger ones, immediately dispersed as soon as the latter was raised. A sharp thunder-shower now coming on put a sudden stop to my investigations, compelling me to leave the haunts of Natterjacks for those of men.

Standlake, Oxon. W. H. Warner.

MICROSCOPY.

Polarizing Salts.—In Dr. Carpenter's "Microscope and its Revelations," 5th edition, 1875, p. 812, you may find a long list of salts, &c., particularly fit for polarizing objects. I have already tried a great many of them, but all do not answer as I should desire, even after many experiments, and some are not polarizing at all. Without doubt, the error is on my side, for want of sufficient knowledge about chemistry. I have thought there was, perhaps, a more general interest amongst professors of micro-polarizing apparatus, as I am writing to know how to obtain really fine preparations from the said salts, double salts, &c. Some hints are to be found in several manuals, but they are very much dispersed. Is it not possible that in your periodical an article could be published about this subject from the hand of one or more experienced chemical microscopists, such as Mr. Kitton and others, according to the list of Dr. Carpenter, and fully describing the *modus operandi* for the several chemicals; viz., the best treatment exclusively for the polariscope? I think this would be useful, not only for beauty's sake, but, perhaps, in order also to promote a taste for chemistry among youth. I shall be glad to see in some following "monthly" that my idea has had your attention.—*J. Kinker, Amsterdam.*

The Preparation of the Diatomaceæ.—J. D. Möller (the well-known preparer of the Typen and Proben Platte) has announced that he will publish a small work on the complete preparation of the Diatomaceæ (Die Präparation der Diatomaceen in ihrem ganzem Umfange). Its contents will be as under:—1. Collecting. 2. Cleaning:—(*a*) *living;* (*b*) *dead forms in mud;* (*c*) *fossil forms.* 3. *The separation of the different species.* 4. The preparation and mounting:—(*a*) *in the usual manner* (*mixed on spread slides*); (*b*) *as selected or arranged;* (*c*) *as Typen and Proben Platte.* The work will be published by subscription at the following prices:—German edition, 30 marks; English edition, 32s.; French edition, 40 francs. In the event of a sufficient number of subscribers being obtained to remunerate the author for making public his method of preparing and mounting the Diatomaceæ, every subscriber will receive his copy in the beginning of 1876 on remitting the amount of subscription to the author—J. D. Möller, Wedel (Holstein); or to C. Baker, 244, High Holborn, W.C.; E. Wheeler, 48, Tollington-road, N.; R. & J. Beck, Cornhill, E.C. Orders must be sent in not later than Sept., 1875; in October the subscribers will be informed whether the book will be published or not.—*F. K.*

Anatomy of Amphioxus.—A paper on this subject has been read at the Linnean Society by Prof. Ray Lankester, F.R.S. The author described the anatomy of *A. lanceolatus* as worked out in a series of sections made from numerous specimens collected by him at Naples. In opposition to Stieda, the truly perforate structure of the pharynx was asserted. A true body cavity or cœlom, distinct from the atrial chamber, was described, and it was shown to expand and attain a large development in the post-atrioporal region of the body. A pair of pigmented canals were described, apparently representing the vertebrate renal organ in a degenerate or else a rudimentary condition. Johannes Müller's pores of the lateral canals were shown to be hyoid slits leading into the pharynx. The attachment of the pharyngeal bars to the wall of the atrium by a series of pharyngo-pleural septa was minutely described. It was further shown that the marginal ridges of the ventral surface (metapleura) are hollow, containing a lymph-space, and that they, as well as the plates of the ventral integuments, disappear when the atrial chamber is largely distended with the sexual products. Drawings by Mr. W. J. Fanning, of Exeter College, were exhibited in illustration of the above statements.

The Compound Microscope in the Examination of Patients.—The *Monthly Microscopical Journal* states that Dr. H. G. Piffard has devised a simple contrivance, by means of which the binocular microscope can be employed in the ordinary "out-patients' room," for the examination of the skin of patients suffering from skin diseases. Dr. Piffard says:—"The objectives which I employ are a 6″, 2″, and 1″ of Grunow, and a 4″ and ½″ of Ross. The ½″ is made with taper front, specially constructed for use with reflected light. The advantages of this arrangement over the single lens are enlargement of the field of view, absence of spherical and chromatic aberrations, convenient distance of the observer's eye from the object observed, ten times the amplification practically attainable with the single microscope, and, lastly, the very great advantage of true stereoscopic vision. With the instrument described any portion of the integument, from the scalp to the soles of the feet can be conveniently examined, and a prolonged examination can be made without fatigue to the observer. The ordinary diffused light of a bright day affords ample illustration with all the objectives except the half-inch. For this we need direct sunlight. If the examination be made at night, or in a dark place, the light from a Tobboed, or other good illuminator, concentrated upon the object, with a mirror or bull's-eye condenser, will answer every purpose."

ZOOLOGY.

THE "CONGO SNAKE."—This curious animal, which is reported in SCIENCE-GOSSIP, July 1, p. 161, as a novel addition to the Manchester Aquarium, and called the Congo Snake, or *Murænopsis tridactyla*, is perhaps the same as the *Amphiuma tridactylum*, which has long lived and grown rapidly in the reptile-house of the Zoological Society's gardens at the Regent's Park, London. Another species, with only two fingers, was described by Cuvier, but later zoologists have considered this as only a variety. Amphiuma belongs to those Saurobatrachians which have temporary gills, while its allies, the Siren, Proteus, and Axolott, have permanent gills. This fact is important, because in our books of comparative anatomy the largeness of the red blood-corpuscles is said to be correlated to the persistency of the gills, an error which was embraced, after Rudolph Wagner, by Professor Owen. But the truth is that Amphiuma has evanescent gills and the largest blood-corpuscles yet known; while in another caducibranchiate species, *Sieboldia*, these corpuscles are larger than those of the perennibranchiate Sirenian or Axolott. When an opportunity occurs, preparations should and could easily be made of the red blood-corpuscles of Amphiuma. These would form a very novel and acceptable addition to the microscopic cabinet. They are so large as to be visible to the naked eye, being considerably larger than the magnificent blood-discs of the Proteus, Siren, and Sieboldia. And it is noteworthy that the blood-corpuscles of Lepidosiren in their largeness present this remarkable sauro-batrachian character, which has never yet been found in the class of true fishes, with which this paradoxical creature is often associated by zoologists, although the late D. J. E. Gray and other eminent authorities consider it rather as a batrachian than a fish. Some of the family of Proteïds, to which all the Saurobatrachians belong, have often been regarded as larvæ of unknown Salamanders, but this notion is no longer entertained. Amphiuma was known upwards of a century ago to that excellent naturalist, Dr. Garden, of Charlestown, who mentioned it particularly in his correspondence with Ellis; and, after the lapse of more than fifty years, Harlan, the North American naturalist, and the illustrious Cuvier, made the Amphiuma more generally known. It is peculiar to North America, while its ally, the Proteus, is a native of Europe. Seeing how well the Amphiuma has thriven in London, we may hope yet to see both sexes introduced to England and breeding in confinement, so as to afford us an opportunity of witnessing how long the creature retains its gills, and other interesting points in its habits and economy. The size and development of the blood-corpuscles in the young animal would be well deserving of investigation. Those of the adult were compared, by Professor Gulliver, in the drawings illustrating his communication to the Zoological Society, June 15, 1875, with the corresponding corpuscles throughout the vertebrate sub-kingdom, and their dimensions given in very extensive tables of measurements.

CASSOWARIES.—It was stated in the article on "Wingless Birds" that only two species of Cassowaries are known. Dr. Sclater, in a paper read before the Zoological Society in January last, gives a list of *nine*. These are *Casuarius galeatus*, from Ceram; *C. Beccarii*, from Wokau and the Aroo Islands; *C. australis*, Northern Australia; *C. bicarunculatus*, from the Aroo Islands; *C. uniappendiculatus*, Papua; *C. papuanus*, Northern Papua; *C. Westermanni*, from the island of Jobie; *C. picticollis*, Southern Papua; and *C. Bennetti*, from New Britain.

PROFUSION OF "BROWN-TAIL" CATERPILLARS. —I have already noted that in several hedges near Gravesend the caterpillars of the above moth (*Liparis chrysorrhœa*) were abundant in 1874. No measures were taken for their extirpation; indeed, though writers in natural history tell us the species was at one time dreaded by horticulturists, it is not at present an object of fear, most probably because of its comparative rarity. Despite the cold spring, in the locality named the caterpillars are still more common this season, positively defoliating a mixed hedge of hawthorn, sloe, and blackthorn, shunning cautiously an occasional maple. It is important to know, could one ascertain, whether the caterpillars of the "Brown-tail" have really the propensity for attacking fruit-trees ascribed to them by some authors. As far as I have observed, they are little inclined to migrate, and gnaw the wood of the hawthorn rather than undertake a foraging journey across a road. It would be easy to collect and destroy the winter nests, with a minimum of pain to the caterpillars—if pain they feel.—*J. R. S. C.*

WORCESTER JUNIOR NATURALISTS' FIELD-CLUB.—A new naturalists' club has just been started in Worcester under the above title. As is well known, a large and flourishing Naturalists' Field-club already exists in Worcester, which holds several field-meetings in the year, each of which occupies a whole day, and is generally held at some distance away. The aims of the new club are somewhat different. It proposes to have very frequent excursions in the neighbourhood on certain afternoons and evenings in the week, and now and then to go farther afield. Thus those who cannot spare a whole day, and do not wish to incur the expense of a long journey, will be able to meet for shorter walks, whose frequency will make up for their want of length. Indoor meetings are also contemplated, when specimens gathered on the excursions can be exhibited, and interesting discussions held on the excursions generally. The aid of the microscope can also be called in to add to the interest of the evening. All interested in botany, geology, entomology, and any branch of natural history, are invited to join, and as Worcestershire is especially favourable for the study of these subjects, the results ought to be favourable. The meetings at present are held on Wednesday evenings and Saturday afternoons. The nucleus of the club was formed by a botany and geology class held in Worcester for two years past in connection with the Science and Art Department, South Kensington, and as the class will be resumed in the autumn, the practical experience gained by members will be found especially valuable. The idea of working a science-class in connection with a field-club seems a good one, and worthy of imitation in other quarters. The president of the club is Mr. W. J. Smith, B.A., of the College for Blind Sons of Gentlemen, Worcester, who conducts the science-classes, and is well known as an enthusiastic naturalist, and there is no lack of enthusiasm among the members. We are also glad to note that a kindred society has been formed in Bedford, called "The Bedfordshire Natural History Society and Field-club." It was founded in May last, and now includes about one hundred members. The hon. secretary is Mr. T. G. Elger, F. R. A. S A microscopical section is attached to the society, to which we wish success.

AN ENEMY TO THE COLORADO BEETLE.—A writer in the *American Naturalist* states that great numbers of the Colorado potato-beetle are destroyed by the Rose-breasted Grosbeak (*Goniaphea Ludoviciana*). The American farmers hold these birds in great favour, and are very careful to prevent their destruction. The birds were so abundant in the neighbourhood of Jeffreson, Wisconsin, last summer, as to completely hold in check the vast army of the potato-beetles.

TORPEDOES IN BRITISH SEAS.—A torpedo, or shock-ray, was caught in a mackerel-seine at Mariegissery, Cornwall, a week or two ago. This rare and interesting specimen, which was in excellent condition, was purchased for the Brighton Aquarium.—*H. Budge.*

BOTANY.

SINAPIS ARVENSIS.—I should like to know if any reasonable explanation has been given of the unfailing appearance of the plant *Sinapis arvensis* on ground that has been newly turned over. If pasture land be ploughed up, this well-known plant (the charlock or kedlock) is the first weed to make its appearance, although none may have been growing previously either there or in any of the surrounding fields.—*J. R. Thomson.*

RAPHIDES AS NATURAL CHARACTERS IN SYSTEMATIC BOTANY.—Commenting on an exhibition of orchids at the scientific meeting of the East Kent Natural History Society, June 9, 1875, Professor Gulliver showed that they all afford an abundance of Raphides, so that no British species of Orchidaceæ has, after diligent search, been found wanting in these curious needle-like crystals. Hence, in our flora this order might be sharply and truly defined as Gynandrous endogens, abounding in Raphides. And so, too, as further illustrations of the value of this kind of diagnosis, if for Gynandrous endogens we substitute Thalamifloral, Calycifloral, or Corollifloral exogens, might be clearly characterized either the order Balsaminaceæ, Onagraceæ, or Galiaceæ. And a knowledge of these facts is the more important because they have not yet been recognized in the books of systematic botany, and are either ignored or treated perfunctorily, in the treatises of microscopy and histological phytotomy, not very creditably to the compilers of this branch of science. The diagnostic characters afforded by Raphides are, moreover, eminently natural, simple, and easy of proof; while the demonstrations are admirably adapted for instruction by means of the microscope, and the vouchers mounted on glass slides make elegant additions to the microscopic cabinet. But Raphides must not be confounded with other and very different plant-crystals, the leading examples of which have been figured in SCIENCE-GOSSIP, May, 1873, and in the *Monthly Microscopical Journal*, December, 1873. It should be borne in mind, seeing the numberless errors of omission and commission in the current books, that microscopic plant-crystals are chiefly of four forms:

—1. True Raphides, needle-like, occurring loosely in bundles; 2. Long crystal prisms, with angular shafts, regularly separate, or only two or three soldered together; 3. Short prismatic crystals, more or less square; 4. Sphæraphides, mostly of a rounded figure, either smoothish or stellate on the surface. The physiological significance of plant-crystals had been described at former meetings of the Society and elsewhere. The taxonomic import of the true Raphides is enhanced by the fact that they are present in every stage and state of the plant, from the cradle to the grave of the species.

"Pyrethrum inodorum. — A double variety, having a multiplied radius and an obliterated contracted disk, was found in Norfolk by the late Mr. Crowe."—(Smith's *E. Fl.*, vol. iii.) A plant, exactly similar to the one above described by Smith, who, so far as I am aware, is the only author who mentions such an occurrence, was found in my parish a week or two ago. The ray florets are in a triple series; those of the disk reduced to a few brown scales, the receptacle quite flat. One great difference from the type also is, that the teeth of the ray petals are enormously lengthened, so as to give the flower a jagged appearance. Unfortunately, there can be no ripened seed, so the plant cannot be perpetuated.—*R. W.*

Living Vegetable Cells imitated.—A recent number of *Der Natursforscher* gives an account of experiments made by Herr Moritz Traube on what he calls "inorganic cells," which were suggested by Prof. Graham's discoveries in dialysis. If a drop of gelatine solution is acted upon by gallic acid, so that a film of a leathery substance is formed round it, an artificial cell is produced; and this when placed in a weaker solution of gelatine will swell and exhibit a physical growth through the endosmose that takes place. Cells with these artificial membranes will have a tendency to thin out at the top, their lower parts being thicker from the downward gravitation of the particles, and as fresh fluid enters by endosmose, the weakest part will be most stretched. The existence of these conditions in plant-cells will favour their upward growth. Herr Traube succeeded in forming cells of different materials, and imitating many physical processes of growth. The enlargement of the cells in his experiments differs materially from the extension of a soap-bubble by blowing more air into it. He observes phenomena of intus-susception analogous to those of plant-cells. The enveloping membrane of his cells is formed by chemical precipitation, which stops when the membrane thickens, and its interstices no longer allow fresh molecules of the membrane-forming material to enter. Endosmose of the surrounding fluid into the cells swells them, stretches their membranes, enlarges the interstices, and allows fresh material to enter, and a new layer to be formed. Thus far they imitate living cells.

Venus's Fly-trap.—At a recent meeting of the Edinburgh Botanical Society Dr. Balfour gave an account of some experiments he had made on the alleged carnivorous habits of *Dionæa muscipula*. According to his investigations, the "irritability" of the leaf is resident in six delicate hairs, which are so placed on the leaf that an insect cannot avoid them in crawling over it. Chloroform dropped on a hair caused the leaf to close directly, but water has no effect. The contraction lasts for a considerable time, and only then when an object capable of affording nutriment has been seized. Dr. Balfour therefore considers that the appellation of carnivorous is fully deserved.

Maiden-hair Fern (*Adiantum Capillus-Veneris*), (p. 137). The occurrence of this fern in the Isle of Man at the place mentioned by Mr. H. J. Marsden, is, together with two other localities in the island, duly noted in the Rev. J. G. Cumming's "Guide to the Isle of Man" (1861), in the chapter headed "Botany." This chapter was abstracted from a paper furnished to the author by the late Prof. E. Forbes, whose knowledge of the Manx flora appears to have equalled in thoroughness his acquaintance with the fishes and mollusca of the island and its coasts.—*Geo. H. Hankinson.* [We collected this fern both at Glen Moy and Peel, in the Isle of Man, more than ten years ago.—Ed. *S.-G.*]

Laburnum.—Yellow and purple racemes growing on same branch. A friend has sent me a branch of laburnum, showing the two distinct colours of flowers; these have no appearance of having been the result of grafting, as the two kinds are interspersed irregularly all over the tree, which is a large one. Is this a common *lusus naturæ*, and would the seeds produce the same sport?—*L.A.B.*

Insectivorous Plants.—Darwin's new book is now out, and being read by all naturalists. It fairly bristles with facts, and the result is startling to our old-fashioned notions about plants.

GEOLOGY.

Cave Animals in Derbyshire.—The Rev. J. M. Mello, F.G.S., is engaged in exploring the crevices and caverns of the Cresswell Crags, on the estate of the Duke of Portland, in Derbyshire. The results up to the present time were submitted to the members in the shape of a valuable and extensive collection of animal remains. Among these are the molars of a mammoth (*Elephas primigenius*); the remains, supposed to be almost complete and belonging to the same individual, of a species of elk; bones of the common fox, the Arctic fox, the wolf, the glutton (which is rarely found in British cave-deposits), of the hyæna, the bear, the horse, the *Bos primigenius*, and the rhinoceros. Several of the bones bore traces of having been gnawed by hyænas. There were also remains of birds and fish, some Roman pottery, and several somewhat rude specimens of flint implements. The latter have evidently been carried in at a later period than the deposition of the bones, &c., of extinct animals.

Fossil Forest in the Coal-measures at Wadsley, near Sheffield.—At a recent meeting of the Geological Society of London, H. C. Sorby, Esq., F.R.S., F.G.S., read a paper on this subject. The author described the occurrence of a number of stumps of *Sigillariæ* in position and with stigmarian roots attached to them, in the Coal-measure Sandstone in the grounds of the South Yorkshire Lunatic Asylum, and mentioned that the authorities of the asylum, in order to preserve these remains, had erected two wooden buildings over them. The trees seem to have grown in what is now a bed of earthy clay-like shale; there to have dried and rotted down to the level of the surrounding mud, leaving hollow stumps, to be afterwards filled up with the sand now forming the superjacent bed of sandstsne. The stumps exposed were about ten in number, spread over forty or fifty yards of ground. The smaller trunks have four, and the larger ones eight roots; and the author specially called attention to the fact that, from the position of these roots, by analogy with existing trees, we may infer the direction of the prevalent wind at the time the trees were growing, and that it appears to have been from the west.

Basalt.—Mr. H. P. Malet has been good enough to refer in the last number of Science-Gossip to a note, published several months ago, in which I argued that the occurrence of apatite and olivine in basalt can hardly be accepted as evidence against the igneous origin of this rock. In that note I sought to show that the phosphates occurring in animal and vegetable tissues may be traced, directly or indirectly, to mineral sources; and that such salts are, in fact, widely distributed through rocks of eruptive origin. But Mr. Malet objects that this explanation is not sufficiently far-reaching. "I want to know," he says, "how phosphate of lime finds a source in igneous rocks. If the animal derives its phosphates from the vegetable, and the vegetable from the mineral, how does the mineral get them?" Such questions are more readily asked than answered. The ultimate origin of the phosphates which occur in igneous rocks is just as obscure as that of the silicates or any other constituents of such rocks—just as obscure, but not more so. It is, of course, no sufficient answer to say that they are formed by the fusion of sedimentary rocks; for the sedimentary rocks themselves are made up of derived materials. The ultimate *fons et origo* is not easily reached. If we seek a cosmical origin for the materials of our earth, we shall find that phosphorus is among those elements which are known to be universally distributed. It is found, for example, in the meteoric mineral *Schreibersite*, and also in Nordenskjöld's recently discovered *Cryoconite*. In fact, Professor Nordenskjöld, having shown that his "cosmical dust" contains a small proportion of phosphorus, has suggested that this dust "may play an important part in the economy of Nature; for instance, in replenishing, by means of its phosphorus, the fertility of the earth after exhaustion by repeated crops."* Be this as it may, however, it is clear that compounds containing phosphorus are very widely distributed, and may fairly be regarded as original components of our rocks. From the rocks they pass to the plant, and thence to the animal, and, on the decomposition of the animal, back again to the soil. This is, of course, what I meant by the "cycle of changes," though Mr. Malet objects that "the cycle has no beginning." If phosphates are regarded as exclusively of animal origin, it is indeed difficult to trace a beginning; for every chemist and physiologist will admit that an organism can simply modify pre-existing matter, and can create nothing. The first organisms that appeared on the earth must, therefore, have derived their inorganic constituents, including phosphates, from the rocks which were then in existence. Mr. Malet insists on asking the question, "What is basalt?" but a satisfactory answer could hardly be given within the limits of a note, and there seems to be the less necessity for entering on the question here, since it has been so often discussed by our ablest geologists. Indeed I should not have ventured to say a word on the subject had it not been pointed out to me that I was responsible for the abstract in the *Geological Magazine* which called forth Mr. Malet's original letter.—*F. W. Rudler.*

NOTES AND QUERIES.

Meaning of Botanical Names.—In reply to "W. G. P.," I annex the following information, for which I am indebted to an old book, called "Loudon's Encyclopædia of Plants":—*Frankenia* was so called in honour of John Frankenius, Professor of Botany at Upsal, who first enumerated the plants of Sweden in "Speculum Botanicum," A.D. 1638. *Dianthus* (Flower of God)—This name was given on account of the pre-eminent beauty of

* "Ueber kosmischen Staub, der mit atmosphärischen Niederschlägen auf die Erdoberfläche herabfällt."—Poggendorff's Annalen, Bd. cli., 1874, p. 154.

the flowers. *Sagina*—Linnæus says this plant was so called because it is valuable for sheep-food, and is generally found on dry pastures. The name in Latin means something nourishing. *Illecebrum*—This name was applied by Pliny to a kind of wild purslane,—its meaning is unknown. The name has been adopted by modern botanists, though it is not now applied to the same plant. *Knawel* (Scleranthus)—This appears to be a corruption of the French designation "Gnavelle, Annuelle." *Elatine*—The leaves of this plant have been compared to those of a fir-tree; hence its name. *Hypericum*—Meaning unknown.—*G. Hardey.*

Parsley.—Why is it said that parsley to be well curled must be sown on Good Friday? Also, that parsley-seed goes nine times to the devil and back, before it comes up?—*M. E. G.*

Flights of Swifts.—To-day (June 18th), at 3 p.m., just as a heavy thunderstorm was bursting upon us, a large flight of swifts was observed overhead from a point on Ashdown Forest about 800 ft. above the level of the sea. These birds do not haunt there, nor are they to be found in any numbers even at the neighbouring villages. Can any explanation be given of this?—*T. C. T.*

Sexes in Hermit-Crabs.—Can any crustaceologist among your readers point out how the sexes are distinguishable in living hermit-crabs? I have several in an aquarium, but they only seem to differ in size, and skirmish indiscriminately with their companions. In descriptions of their habits they are spoken of as only quitting their adopted shell to change it for a larger one, which I have seen them do, but there are probably other occasions on which they venture from their shelter.—*G. G., Ventnor.*

Lathræa squamaria.—Can any of your readers tell me of habitats in this neighbourhood? I have found it on a hill near here on the roots of sycamore-trees, but have not seen it elsewhere.—*W. Bradley, Dudley.*

Remarkable Halo.—I am induced to send you a diagram of a (to me) very remarkable halo which I witnessed last Saturday, June 6th, while driving in the Isle of Wight; the wind at the time was S.W., the sky in that quarter looking what sailors call "dirty"; the sun's rays at the time were intensely hot. Rain subsequently fell in the night and early morning.—*Windsor Hambrough, Rector.*

Etymologies (p. 143).—If "W. G. P." will refer to Paxton's "Botanical Dictionary," he will find explanations of the scientific names of most plants. Thus, taking his list:—*Frankenia*—"Named by Linnæus, in honour of John Frankenius, professor of Botany at Upsal, who died in 1661." *Dianthus*—"From *dios*, divine, and *anthos*, a flower, in reference to the fragrance of the blossoms and the unrivalled neatness of the flowers." *Sagina*—"From *sagina*, fatness, in allusion to its presumed nourishing qualities for sheep." *Illecebrum*—"From *illicebra* of Pliny, which is derived from *illicio*, to allure; pretty, enticing plants." *Elatine*—"From *elate*, signifying a fir in Greek; its leaves have been compared to those of the fir-tree." *Hypericum*—"The name is said to be derived from *uper*, above, and *eikon*, an image; the superior part of the flower represents a figure." According to Miller's "Gardeners' Dictionary" (1768), the name "Deptford pink" was applied to *Dianthus armeria*, from the fact that among other localities in England it grew "particularly in a meadow near Deptford, in Kent."—*Geo. H. Hankinson.*

Contributors' Corrections.—I read the remarks of your correspondent "E. B.," in the June number, with considerable interest. My acquaintance with your very interesting journal commenced with the issue of its first part. Now, I quite agree with him that contributors should be very careful to know they are right before seeking to correct others; and this should always be done courteously and considerately. Of course, to a lady this is the more due; at the same it would not be a wholesome practice to let manifest inaccuracies or misleading statements pass unchallenged. Whatever amount of fancy may be indulged in, in describing facts, we must, to be instructive, strive after something like accuracy. It is a pity that so talented a lady as the one to whom your correspondent refers should rather pride herself upon this careless style, and give room for corrections which seem often positively needful. As an instance of want of care let me point out "The Upas-tree," in your recent number. In the first clause it is evidently meant that the fabled accounts as to the *poisonous atmosphere* said to be diffused by this tree are found to be either entirely without foundation or greatly exaggerated. Then, after rightly ascribing the cause of these pernicious effects to the carbonic acid gas which escapes from crevices in the ground, the *sulphurous vapour* is spoken of, which is quite a different agent to the carbonic acid gas, and one not at all likely to be present. It is perfectly true that the natives use the inspissated juice for rendering their arrows poisonous, and that its poisonous effects are owing to the presence of *antiarin*. But if it is intended to mean that the natives use this *antiarin* itself, it is an error, it being far beyond the reach of their chemical powers to extract.—*W. C. H.*

Monkey's Cup.—The other day as I was walking around my garden I saw the phenomenon provincially called the Monkey's Cup. From the midrib (in some cases the midrib rises from the leaf altogether), in about the centre of the leaf of a cabbage (*Brassica oleracea*), grew up what looked like the peduncle of a flower 2½ inches long, on the top of which was a deeply-concaved cup about $\frac{7}{10}$ of an inch wide, in which dew collects. On another close by I found one on a stalk 6 inches long, which had grown from the root. Can any of your readers say what is the cause of these singular cups, and if they are of common occurrence?—*L. W.*

Animal v. Vegetable Life.—A friend has asked me to try and find for her what will kill *animal* but not *vegetable* life. It is very probable that among your large circle of readers there are those who have had the same difficulty to contend with. In her garden she has a considerable-sized fountain, with water-lilies growing in; and there also come (uninvited) a large number of horse-leeches, which latter is the animal matter she wishes to destroy. My scientific friends cannot help me in this matter, but have advised me to write and ask you to help me. If in an early number you can advise me I shall feel favoured.—*E. Emilie.*

Do Fishes utter Sounds? (Note, p. 141).—This question I am able from personal observation to answer in the affirmative. A few years ago I was trawling in Donegal Bay, when we caught a considerable number of the *grey gurnard* (*Trigla*). There was a small well in the after-part of our boat, in which the fish were put, and we observed that the gurnard kept up, at intervals, *a hoarse croaking* noise for some time after they were caught. This species is known among the fishermen of the north of Ireland as the "Nowd."—*H. Allingham, Ballyshannon.*

SLUG-THREADS.—Last summer (Sept. 29th) I met with the following unusual fact. In a greenhouse from a vine-leaf which was within a few inches of the glass and about 4 feet from the surface of the water in a tank, a slug was hanging by a thread, which was more than 4 feet in length, not unlike a spider's web, but evidently much stronger. The slug was descending by means of this thread, and as the glutinous matter from the under-part of the body was drawn out by the weight of the creature, it was consolidated into a compact thread by the slug twisting itself in the direction of the hands of a clock, the power of twisting being given by the head and the part of the body nearest the head being turned in the direction of the twist: there was no tendency to turn in the contrary direction. Evidently the thread became hard as soon as it was drawn away from the body. By wetting the ends of slips of glass I secured two specimens from the thread; in one of these, part was stretched and part quite loose, the latter appearing flat when seen through a microscope. The thread, which was highly elastic, was increased about 3 inches in a minute. The slug was white, and about 1½ inch in length.—*R. S. T., Surrey.*

MARTINS.—Some martins for the last three years have built under the eaves of my house, and each year I have remarked *three* birds are employed regularly, and apparently alternately, in bringing the materials for the formation of the nest. I never saw, in other cases, but the pairs of birds occupied in building, and should like to hear if this is a peculiarity attached to the martin, and if it has been remarked before.—*M. A. W.*

DREDGING OFF THE DEVONSHIRE COASTS.—Dredging will be carried on to some extent in the neighbourhood of Teignmouth in July, August, and September. If our scientific friends will visit us they will be able to get dredges, yachts, and boats of all sizes. The yachts have every accommodation even for ladies; they are decked, have good cabin and bed or sofa berths, a good fore-cabin for cooking, &c., and a well where you can sit or stand, and view the curiosities that the dredge-net brings up from the bottom of the sea. The dredging-ground is Dawlish Bay, and as far as the Exeter rocks, and near the Sidmouth coast; also off Teignmouth, Babbicombe Bay, Torbay, and Start Bay. The dredging-ground is rich in all kinds of things required by a collector. A good yacht can be had for a party at four or five pounds per week; a good sailing boat at ten shillings per day; and a boat for a few shillings. The ledges and benches of rocks are very rich in all kinds of sea-anemones, and other marine animals, particularly the Dawlish rocks, Shaldon rocks, Anstie Cove, and the mouth of the Dart river. On land there is the fossiliferous district of Haldon Downs. Again, there are the Bradley woods, where the beautiful feather Madrepore is found (*Favosites Forbesi*), and Ramsley rocks, where the rare angle-star Madrepores are found (*Cyathophyllum hexagonum, Acervularia limitata, Smithii*, &c. &c.). Near again are the Barton rocks, where the Madrepores are found, known here by the name of Barton stars. The *Hallia Pengellyii*, and the *Acervularia carinata*, are very beautiful amongst them. On the Ness side of the Teign river Madrepores can be found on the beaches at any time of tide. But the rarest and most beautiful varieties are found at the Parson and Clerk rock, Teignmouth. They come out of the red rock as rough stones, and get washed on the beach as pebbles; they are generally tinged in the centre, or all over, with red oxide of iron, derived from the red rock. The flush of red makes them look very beautiful, and the Madrepores after being polished two or three days, will show themselves very distinctly. There has been lately a great fall of the cliff, and collectors are very busy with their hammers breaking the stones for Madrepores. I have seen some lately found worth ten pounds each. I shall be glad to give your readers of SCIENCE-GOSSIP any information on the subject of dredging, &c., if they will send a stamped envelope to *A. J. R. Sclater, Teignmouth, Devon.*

CAT'S TAILS.—The uses of these organs are very varied. On reading the interesting article on animals' tails in a late number, with reference to that of the cat, a young naturalist observed that *the weather* leads to its *different* uses of diverse benefit. Our puss uses her tail, like the somnolent feline gentleman spoken of, as a *muff* or boa in cold weather. She now makes use of it as a *plaything* to amuse, or more probably to educate, her kitten.—*F. H. Arnold.*

THE CUCKOO AND THE WAGTAIL.—I have just witnessed a curious and ridiculous spectacle, the feeding of a young cuckoo by its foster-mother, a water-wagtail. It was enacted on my lawn this morning, at breakfast-time, and I watched it through a powerful telescope. The cuckoo (whose weak little whistling voice contrasted curiously with its great bulk) had been sitting on, or rather clinging to, a hanging poplar-bough, but came down on the lawn, and squatted down on the approach of the wagtail, clamouring for the food which the latter had brought. The wagtail ran up to her relatively-gigantic adopted child, which opened its mouth widely, and inserting her head into its enormous gape, put the insect which she had caught down the cuckoo's throat. This was repeated some eight or ten times. The whole performance was so absurd, and so highly suggestive of a pantomime, that I was rather disappointed that it did not conclude by the foster-mother herself jumping down the cuckoo's throat. I really think that she would not have had much difficulty in doing so.—*William Noble.*

ASPEN.—The tradition is that the wood of the cross of Christ was the aspen-tree (*Populus tremata*), and that the tremulous motion of the leaves is a perpetual horror at the purpose to which the tree was applied. What better than a sacred aspen stake to "drive into the dead body of a witch" or other associates of the Devil?—*W. Budden, Ipswich.*

NATURAL HISTORY IN NOVELS.—Carlyle, the well-known author, tells an almost similar story concerning the goose—not the barn-door fowl, as in the instance quoted (p. 143) by "R. S. T." In one of his works he compares the stupidity of certain bipeds of the genus *Homo*, to that of a goose, which if you place it on the ground, and place its bill in the ground, and draw a circle round it with a lump of chalk, will remain motionless until it starves, rather than pass beyond the imaginary barrier. I do not keep geese myself, nor do my neighbours, so I cannot try the experiment. Perhaps some one will do so, and let us know the result. At present I am fully prepared to accept the statement as a fact, in the case either of the "rooster" or the "gobbler."—*J. R. S. C.*

CANTERBURY DISCOVERIES.—Upon reading the communication of Mr. J. Anderson, jun., in the May No. of SCIENCE-GOSSIP, it suddenly came to my recollection that two collections of British Lepidoptera, "principally taken this season (1873) near Canterbury" had been offered by auction in London about a year ago. The catalogues teemed with specimens of *Leucania, L. album, L. albipuncta, C. erythrocephala, Polia nigrocincta*, many *A. lathonia, Pachetra leucophæa*, &c. I never heard what prices were realized, but I fear there are many rich dupes in the entomological world who would not scruple to give £2 or £3 for several of the rarer of the above-named. Of course, the auctioneer is in no way to blame; his duty is to get the best price he can for his customers, and he is not supposed to be responsible for their untruthful statements; but if the public are so easily taken in by so evident an imposture, so long will that imposture flourish, and before long become formidable enough to strike a death-blow at all that is charming, fresh, and innocent in a true, insect-loving career. The ridiculously high price given for rare British insects of course tends to make dealers more greedy of gain; and what can be easier than to obtain from Europe certain specimens, which, though common there, are almost unique or very rare with us, and to pin and set them English fashion? It is much better to keep two separate collections, one of foreign (European insects), and one of British, than fill the latter with evidently spuriously-native specimens. Dealers who so unscrupulously write to the leading magazines about a wonderful capture at sugar or at rest of this or that species, only known to exist heretofore on the Continent, commit (anything but a pious) fraud, and if detected, and detection is sure to come sooner or later, would no doubt be cashiered from the field of entomology, as they richly deserve. I have two dealers, in particular, in my mind as I write; I shall not mention their names, but would recommend them in future to take as their example such an upright and conscientious entomologist as Mr. Harwood, of Colchester, and they will find themselves the better for it in the long run.—*C. M.*

GOOSEBERRY CATERPILLARS, AND HOW TO GET RID OF THEM.—For some time this subject has been discussed in our GOSSIP. I am surprised no one has mentioned *powdered hellebore* as a most effectual method of destroying the pest. It is used largely in this neighbourhood, where a large quantity of gooseberries are produced not only for our own consumption, but for the Bradford, Leeds, and other markets. Good powdered hellebore is about 1s. to 1s. 4d. per pound; it is mixed with about the same quantity of *fine sand*, and dredged upon the trees after a shower or dew, sometimes the trees are watered before dredging them. I have seen it largely used, and have used it in my own garden. This year an attack was made upon my trees; my gardener used the hellebore once, and we have seen no more of the caterpillars.—*H. E. M.*

CATS AND MUSIC.—The instance which "Musicus" brings forward in the June GOSSIP, of a cat showing pleasure at a particular tune whistled to her, is certainly curious and interesting. We, too, possess a cat which is very sensible of the whistling of tunes, and which will, even when with her young kittens, show great uneasiness immediately the whistling commences, and rise and leave them to follow the person about, ending by trying to seek for the unaccountable sounds in the very mouth of the performer. Still, unlike the cat of "Musicus," she seems to experience more uneasiness than pleasure. I have never heard of any other instance in which it has a similar effect.—*F. C. R., Gwastad.*

NATURAL HISTORY IN NOVELS. — The incident about the rooster, taken from "Katerfelto," the accuracy of which appears to be doubted a little by "R. S. T." in your last month's number, is quite in accordance with fact. I have often heard of fowls being thus "mesmerized," and can vouch for the truth of it from personal observation; in fact the experiment is easily tried. Catch your chicken, hold its beak close down to the edge of a large slate, or a board, and draw a line with chalk from the beak right across for a foot or two. The bird will remain perfectly motionless, its eyes fixed on the line, and you will find it quite a difficult matter to frighten it away. The head appears as if glued to the edge of the board.—*F. C. R., Gwastad.*

WHITE CLOVER (*Trifolium repens*).—Even unscientific observers are aware of the fondness of this plant for lime, and some of them are believers in the theory that white clover can be raised without seed. Some extraordinary instances of lime or chalk producing a crop of white clover, where it did not previously exist, are on record; but I do not remember meeting with anything like a satisfactory explanation of the phenomena.—*W. Macmillan.*

BOOKS, &c. RECEIVED.

"Rudiments of Geology." By S. Sharp, F.G.S. London: E. Stanford & Co.

"Principles of the Marine Aquarium." By W. R. Hughes, F.L.S. London: Van Voorst.

"Flora of Eastbourne." By F. C. S. Roper, F.L.S. London: Van Voorst.

"The Lepidopterist's Calendar." Second Edition. By Joseph Merrin. Gloucester: Herbert Marsden.

"Insectivorous Plants." By Charles Darwin. London: John Murray.

"Birds of the North-West." By Elliot Coues. Washington: Government Printing Office.

"American Naturalist." June.

"Canadian Entomologist." June.

"Popular Science Review." July.

"Monthly Microscopical Journal." July.

"Land and Water." July.

"Journal of Applied Science." July.

"The Colonies." July.

"The Linguist." July.

"The Educational Review" July.

"Boston Journal of Chemistry." June.

"Ben Brierley's Journal."

COMMUNICATIONS RECEIVED UP TO 6TH ULT. FROM:—A. H. L.—G. E. Q.—A. S.—W. H.—T. C. M.—T. G. E.—G. V. D.—M. K.—G. H. H.—M. P. M.—W. H.—H. W.—A. T. J.—E. E.—G. H. H.—B. D. J.—W. M.—W. E.—R. H.—E. M. C.—H. B.—W. S.—R. S.—S. A. B.—H. A.—J. O. S.—W. G.—H. W.—F. C.—W. K. M.—L. W.—W. H. G.—J. H. W.—J. G.—J. R. D.—F. E. M.—W. J. S.—J. C.—F. C. R.—A. B.—C. H. M.—R. L.—M. E. G.—T. C. T.—H. J.—G. G.—W. G. P.—H. J. M.—C. H. R.—T. E.—E. E.—Dr. F. A. L.—W. C. H.—H. E. M.—T. G. E.—W. H.—E. F. L.—S. M. P.—H. M. J. U.—F. W. R.—T. P. J.—A. J. R. S.—J. R. T.—F. H. A.—A. M.—M. A. W.—S. M. E.—H. E. W.—J. T.—F. K.—J. G.—G. G.—P. L. S.—W. H. W.—F. H. A.—C. H. M.—H. G. G.—G. H. K.—E. W.—W. W.—E. T. N.—H.—A. A.—H. M.—W. T.—W. E. S., &c.

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

ELLEN FISHER (West Brompton).—Your foreign mosses are:—1, *Climacium dendroides*; 2, *Dicranella varia*; 3, *Tortula tortuosa*; 4, *Gymnostomum rupestre*,—all natives of Britain.

J. A. P.—Procure Robinson's "Alpine Flowers."

T. P. J.—No. 1 is the mouse-eared chickweed. *Cerastium arvense*. No. 2 is a portion of a grass, *Holcus mollis*.

SIGMA TAU.—The insect sent is an Ichneumon, *Ophion*.

P. G.—The mineral in small red box is Galena (lead sulphite); the other is dark Fluor Spar ("Blue John," so called by the miners to distinguish it from "Black Jack," the name they give to zinc sulphite).

MISS E. N.—Your plants are:—1, *Geranium molle*: 2, *Epipactis palustris*; 3, *Drosera intermedia*; 4, *Erythrea centuarea*.

H. L. EDWARDS.—*Veronica becca-bunga* has a decidedly blue flower, although some specimens have a light purple tint.

W. ROCHE.—Your geological specimens are undoubtedly from the carboniferous limestone. No. 1 is a worn specimen of *Syringipora*; 2, *Producta Martini*; 3, *Spirifera rotundata*; 4, *S. glabra*; and 5, a fossil coral, *Lonsdalia*.

M. J.—There is a Field Club and Natural History Society in connection with the Working Men's College, Great Ormond-street, Bloomsbury. Meets every Tuesday, at 8 p.m.

E. M. C.—A geological book of the most elementary character is Taylor's "Geological Stories," illustrated with 200 cuts, and published by Hardwicke, 192, Piccadilly, at 4s. Other valuable elementary geological books are Clifton Ward's "Elementary Geology," Sharp's "Elementary Geology," and Page's "Elementary Text-book."

S. M. EVANS.—The gas always burns better at the upper part of a building, because the pressure carries a greater quantity there, thereby receiving the amount supplied to the lower burners. The amount of carbonic acid in the lower region of the theatre also tends to weaken the light.

W. N. T.—Get Mr. Kitton's edition of Lankester's "Half-Hours with the Microscope" (London: Hardwicke). You will find there the best chapter on polarized light and the phenomena of polarization with which we are acquainted.

W. T. GREENE.—Cayenne pepper is usually given to birds in captivity as a stimulant, mixed in such a way with their food as will insure its being devoured. Its effect on drooping or moulting birds is very striking. Canaries and parrots are especially benefitted by it, and their plumage is restored afterwards in a marked degree.

S. S. BARNES.—Your specimens did not "fall" with the rain, and undoubtedly your friend's explanation is correct. They are called *Nostoc commune*. For an account of them, and for an illustration, both of external shape and internal structure, consult the November number of SCIENCE-GOSSIP for 1871.

W. J. HORN.—Your specimens reached us in a high state of decomposition, so that all we could tell about them was that they were the larvæ of one of the burying beetles.

CHEMIST.—Fluorine cannot be isolated, because it decomposes the vessels used, whether they be of glass or metal. See Brande's "Chemistry" for the re-actions you require.

B. M.—The insects are the Death-watch Beetle, *Anobium tessulatum*. The shells found in the crop of thrush are *Clausilia*, a common land shell in many places.

HON. MRS. S. W.—The moth sent is tolerably common. It is the male of the Ghost Swift, *Hepialus humuli*.

C. H. M.—The names of the zoophytes will be given as soon as possible. Your insect seems to be a *Beckia*, but for information on the *Thysanuradæ*, see the December number of SCIENCE-GOSSIP for 1872, and the January number for 1873. Both articles are illustrated with the commoner British forms of Podura.

C. H. R.—The plant which sprung up so unaccountably from manure is the Tobacco-plant, *Solanum nicotianum*. No. 2 is a common British species, the Perennial Dog's Mercury, *Mercurialis perennis*.

H. JOSS.—The specimens are the larvæ of the Saw-fly.

EXCHANGES.

Papilio Machaon.—Fresh, and well-set specimens of the above offered for any of the following, in any stage:—*Bombyx cecropia*; *B. pernyi*; *B. polyphemus*; *Actias luna*; *Saturnia pavonia major*, or any other good foreign Lepidoptera.—Robert Laddman, Cossey-terrace, Upper Hellesdon, Norwich.

Terebratula biplicata; *Solarium ornatum*; *Ostrea frons*, and other Fossils from Greensand, for other common Fossils.—J. H. Webb, 9, Millard-road, Stoke Newington, N.

GERARD VAN SWIETEN, "Commentaria in Hermani Boerhavi Aphorismos de Cognoscendis et Curandis Morbis," 5 large vols., for other Books, or offer.—R. S., 34, Manchester-street, Notting Hill, W.

PLANTS of *Lastrea cristata* for *L. rigida*, *Cystopteris alpina*, *Pseudathyrium alpestre*, *Cystopteris montana*, *Osmunda regalis* (tasselled), Woodsias.—Rev. S. A. Brenan, Pomeroy, County Tyrone.

L. adonis, *L. corydon*, *H. malvæ*, *H. tages*, *S. ligustri*, &c.; pupæ of *C. dominula*, *L. dispar*, *L. chrysorrhœa*, *D. cæruleocephala*, and many others. Lepidoptera, Birds' Eggs, and Mollusca, wanted in exchange.—W. K. Mann, Granby House, Granby Hill, Clifton, Bristol.

CONTINENTAL PLANTS.—*Orobus canescens*, *O. canescens*, var. *angustifolia*, *O. jordianus*, *Saxifraga pulchella*, *S. orientalis*, *Erinus alpinus*, *Draba aizoon*, *Aubrietia grandiflora*, *Geranium nepalense*, *Campanula pumila*, *Saponaria ocymodes*, *Scutellaria ambigua*, for English Plants, offers.—Alex. Macindoe, Maryhill, N.B.

SIX Torhay Bonnets, *Pileopsis ungaricanus*, six Polish Slabs of Madrepore, six Minerals, six Fossils. Six of the above specimens will be given for two perfect specimens of the Dudley Trilobites.—A. J. R. Sclater, Teignmouth, Devon.

DIATOMACEOUS Earth, containing all the forms of, and supposed to be identical with, Bermuda Earth, for any microscopic object of interest, preferably mounted.—Address, until 15th of August, Swan M. Burnett, 13, Montague-street, Russell square, W.C.

FOR beautiful Leaf of *Rhododendron Gibsonii*, with scales, send stamped directed envelope, with any good unmounted Object, to J. Graham, Borough Cemetery, Ashton-under-Lyne.

WANTED, 276, 574, 1259, 1330, 1383, 1515; in exchange, 277, 576, 831, 1333, 1384, 1494.—Rev. F. H. Arnold, Fishbourne, Chichester.

Pyrola arenaria, for other rare plants.—John W. Barton, 35, Heman's-street, Liverpool.

FOR Leaf of *Smyrnium olusatrum*, with cluster-cups, send stamped, directed, large, commercial-size envelope to J. Turner, Davenport, Stockport.

THE new British *Carex ornithopoda*, *Willd.*, and *Isnardia palustris*, for distribution. Wanted, Nos. 511, 721, 937, 1234, 1236, 1243, 1266, 1279, 1451, and *Zostera nana*, in fruit.—Dr. F. A. Lees, F.L.S., Middleton, Teesdale.

HAIR of *Bombyx yama-mai*, send a stamped directed envelope to W. H. Gomm, Somerton, Taunton.

SPECIMENS of *Sphinx ligustri* for other Lepidoptera.—H. Wigglesworth, 1, Lewisham-terrace, Lewisham.

CRYSTALS of *Zeolite*, from the basalt of Giant's Causeway; make brilliant polariscope objects. Specimens for any other micro-geological materials or Slides.—W. Gray, Mount Charles, Belfast.

Colias hyale and *Cherocampa porcellus*, for large Beetles, as *Astinomex ædilis*, *Lucanus cervus*, &c.—R. Haynes, 3, Snargate-street, Dover.

SHELLS.—Living or prepared specimens of *Cyclas cornea* for any other species of Bivalves.—W. E., 84, East-street, Chichester.

I HAVE for exchange a great many Silk Cocoons (living) of the *Bombyx mori*. Will shortly have some eggs of the same.—For particulars, Joseph Gaunt, 23, Martin-street, Woodland-terrace, Halifax.

FORAMINIFERA from chalk well, mounted in balsam, for any other good Slide, mounted. No seeds or crystals. Many others to exchange.—M. D., 116, Esplanade, Deal.

GOOD Micro. Objects for Mole Crickets, Great Green Grasshopper, Stag Beetles, Field Crickets, Locusts, &c.—G. E. Quick, Long-lane, Southwark.

W. G. PIPER wishes to exchange Fruits, Seeds, and other Vegetable Products. A large number of Duplicates on hand. Wants especially, Woods (timber, dye and ornamental), Indiarubbers, and Guttaperchas.—Address, Bank Plain, Norwich.

Lepisma Scales (mounted), or Peruvian Guano, containing Diatomaceæ, for Barbadoes Earth, or any other Diatomaceous Deposit.—H. C. S., 72, Brougham-street, Handsworth, Birmingham.

WANTED, complete set "Journal Quekett Micro. Club"; good Micro. Slides given in exchange. Also Smith's "Diatomaceæ," in 2 vols.; will give Cash or Slides in exchange.—A. Allen, Felstead, Essex.

I HAVE a large number of Forest Birds' Eggs, blown with one hole, for those of Sea and Coast Birds. Amongst my duplicates are Green and Great Spotted Woodpecker, Nuthatch, Creeper, &c.—W. Watkins, 25, Rutland-street, Hampstead-road.

PROFESSIONALLY-MOUNTED Slides of Zoophytes, &c., offered for good unmounted specimens of the rarer forms of Hydroida and Polyzoa. Good *Lepralias* particularly wanted.—Edward Ward, Higher Broughton, Manchester.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XI.—THE BEET.

THE Beet is mentioned both by the Arabic and ancient Greek authors as one of their dietetic plants. The latter held this root in great esteem, for it was their custom to offer it on silver to Apollo, in his temple at Delphos. It was only the leaves of this plant that were eaten by the ancients. The Greeks distinguished two kinds, according to their colour, the white and black beet, the last, according to Fée, would answer to one of the purple kinds. It was Theophrastus's opinion that the white is more juicy than the black, and it produces less seed. It was generally known as the Sicilian Beet, where it grew in great abundance, and in those days formed a considerable portion of the diet of the inhabitants of that island. Beta stands at the head of one of Martial's epigrams. He describes it as food only fit for the artisan, as it required pepper and wine to make it palatable to a refined taste.

> "Insipid beet may bid a tradesman dine,
> But asks of thee abundant spice and wine."

Pliny gives an accurate description of this vegetable. He says, "Our people distinguish two varieties, the spring and autumn kinds, so called from the period of sowing; but some consider the best time to be when the pomegranate is in flower. The young plants, when they had thrown out five leaves, used to be transplanted, and they thrive all the better if, like the lettuce, the roots are well covered with manure in a moist soil." This author informs us that this vegetable was mostly eaten with lentils, beans, and mustard to relieve its insipidity. Beet is a vegetable with a twofold characteristic, partaking of the nature of the cabbage in its leaves, and resembling a bulb in the root. It was a custom with the Romans to put a light weight upon the plants the moment they began to assume the proper colour, in order that they might cabbage, and the larger the heads the more highly they were esteemed. Those grown in the territory of Circeii sometimes produced heads two feet in breadth. Pliny states that there was also a medicinal difference between the two varieties, the white being remarkable for its purgative qualities, and the black being astringent. "When wine in the vat," says the same author, "has been deteriorated by assuming a flavour of cabbage, it may be restored to its original taste by plunging beet-leaves into it."

Beet is said to have been first cultivated in England in 1548, at the period when many of ou culinary vegetables were introduced or improved. Our old friend Gerard observes, "that Red Beet boild eaten with vinegar and pepper is a most delicate and excellent sallad, but what might be made of the red and beautiful root I refer unto the curious and cuning cook, who no doubt when he has had the view thereof, and is assured that it is both good and wholesome, will make therefrom many divers dishes both fair and good." This Red Beet was cultivated by Tradescant at Lambeth, in 1656. The white variety appears to have been introduced from Portugal, and Evelyn, in his "Aretaria; or, a Discourse on Sallets" (published in 1699), states that the coster or midrib of the leaves of this variety, when boiled, melts and eats like marrow. In 1747 the celebrated Prussian chemist Margraff discovered the existence of a certain portion of sugar in beet-root. This discovery was communicated to the Scientific Society of Berlin, but no attempt was made to carry the principle of the investigation into practice.

Forty years after this, Arhard, another Prussian chemist, resumed the experiments which Margraff had commenced, and he was so enraptured by the prospect which his labours opened to him, that he announced the beet-root as one of the most bountiful gifts which the Divine munificence has awarded to man upon the earth, affirming that not only sugar could be produced from it, but also tobacco, molasses, coffee, rum, arrowroot, vinegar, and beer. The Institute of Paris, however, did not sympathize with Arhard, for in 1800 a committee of that body, having gone through a series of most careful experiments, reported that the results were so unsatisfactory that it would be unwise to establish any manufacture of sugar from beet. In 1809 Bonaparte, endeavouring to destroy the colonial prosperity of Great Britain, passed a decree prohibiting the purchase of West Indian produce in France, and sugar being an article of the first necessity to the French, this law caused much dissatisfaction to the public, and Napoleon had to consider how the wants of the people could be supplied without foreign commerce. M. Deyeux, a member of the committee appointed to consider this question, turned his attention to the beet-root. His experiments were more satisfactory than those of the committee of 1800, probably because the necessity of producing sugar at home was more pressing. An imperial manufactory of sugar was forthwith established at Ramboulet, imperial schools were instituted for instructing pupils in the process, &c., and by 1812 the manufacture of beet-root sugar was considered prosperously set on foot.

The root from which sugar is extracted is the white variety (*Beta vulgaris campestris alba*). There are now several large manufactories of this article, both in France, Belgium, and other parts of the Continent, and its production is increasing in Australia and Tasmania. Dr. Ure states that he has obtained 5 per cent. of good sugar from white beet grown near Mitcham, in Surrey, and during the last few years the experiment of cultivating beet for the purpose of manufacturing sugar and alcohol therefrom has been successfully carried out in some parts of England, and it is probable that it will become a profitable and important business. The refined sugar from the beet-root looks extremely well, but is not so sweet as the less-refined article from the sugar-cane. One ton of beet-root is reckoned to produce 55 lb. of refined sugar. As long since as 1837 there was a manufactory for refining beet-root sugar established at Chelsea; and at the present time in France there are more than 400 factories for making this article: and each year it is brought to a higher state of perfection. There are three or four journals published in that country entirely devoted to this subject. A white variety of beet is now extensively cultivated as food for domestic animals under the name of Mangolds, formerly known by the German name *Mangel wurzel.* The first seeds of this plant were sent to England from Metz by Thomas B. Parkins to Sir Richard Jebb, in 1786, who presented some of them to the Society of Arts, and by them were distributed to several parties; but the first cultivators of this root on a large scale for agricultural purposes were Sir W. Jerningham and Sir Mordaunt Martin, of Burnham, in the county of Norfolk, about 1790. A Mr. Newby introduced its cultivation into Cambridgeshire in 1812. He published an interesting pamphlet upon the subject. Dr. Lettson also wrote a small work on the introduction of this root into this country in 1787.

When the Regent's Park was forming, a part which had been trenched was sown very thick with mangold seed, and such was the produce that it was sold by auction to cowkeepers in the neighbourhood at the rate of £80 per acre.

This plant is now very largely cultivated by agriculturists, and may be considered the most important crop next to the turnip. Of late years there have been several varieties of mangold introduced fitted for field cultivation. Year after year are exhibited some enormous roots of this plant at the various agricultural shows. At the Agricultural Hall at Islington, Christmas, 1874, might be seen some single roots of Messrs. Sutton's "Mammoth" mangold, grown upon poor dry soil in Suffolk, weighing 40 lb. and upwards. Perhaps one of the largest crops of this plant on record is that which was grown on the sewage-farm of the Earl of Warwick, near Warwick. This crop reached the extraordinary weight of 82 tons per acre. (*Vide Chamber of Agric. Jour.*, 30th Nov., 1874.)

There appears to be three species of beet, from which have sprung the several varieties now in cultivation.

Matthiolus, in his "Commentarii," published in 1565, has given some beautiful wood-engravings, considering the early period they were produced, of three kinds of beet, which he calls *Alba*, *Nigra*, and *Rubra*.

Gaspard Bauhin, whose "Pinax" was published in 1623, enumerates nine species, six of which he calls minors and three majors. Linnæus reduced these nine, in "Species Plantarum," to two, viz., *Beta maritima* and *B. vulgaris*; but in the fourteenth edition of his "Systema Vegetabilium" the *Beta alba* of Bauhin is admitted as a species under the name of *B. cicla*. Thaër's opinion is that the field beet, or mangold, is a hybrid between the red garden and white sugar beet.

Beta maritima, or sea beet, is a herb growing wild on our shores, as at Dover and other places. It is also found in abundance on the west coast of Ireland. The leaves are used as an early substitute for spinach, and are considered an excellent dish, and perfectly wholesome. It is called by the people living on the coast Coliff Spinach. According to Bentham, the white and red beet of our gardeners and the mangel-wurzel of our agriculturists are the cultivated varieties of this species; but opinions differ, as in most things, and other botanists consider that our cultivated root is a native of the South of Europe. The white garden beet (*Beta cicla*) is extensively cultivated in Switzerland and Germany; the stout midribs and footstalks, called "chards," are boiled and eaten like asparagus. The root of the garden beet is exceedingly wholesome and nutritious; and Dr. Lyon Playfair has recommended that a good brown bread may be made by rasping down this root with an equal quantity of flour. Good domestic ale has also been made from it (*vide* Hogg's "Veg. King."). The roots, dried and ground, are sometimes used as "a supplement to coffee." They have also been candied for sweetmeats. The juice of the red beet is sometimes employed as an economical rouge by the young lasses in the Highlands when they wish to look blooming. The use of this root for salad and for garnishing dishes is well known. There are also several varieties now introduced for the purpose of decorative planting in flower-gardens. One kind from Chili is especially adapted for shrubberies, the foliage presenting a great variety of colour. This plant, it is said by some authors, takes its name Beta from the shape of its seed-vessel resembling the second letter of the Greek alphabet. Withering says that the English name Beet is derived from the Celtic word *bett*, signifying red. The origin of the name mangel-wurzel, "root of scarcity," by which it was known when first introduced, arose from a mistake of a Frenchman, Abbé de Commerell, who wrote a treatise on this plant, and called it Mangel, German for scarcity, instead of Mangold, red beet. The French called it Racine de Disette, but afterwards Racine d'Abondance, and, from its property of growing with a large portion of its root above ground, it is also known by the name of Bette Rave, Sur terre, &c.

HAMPDEN G. GLASSPOOLE.

SPIDERS' WEBS AND SPINNERETS.

SINCE writing the paper which appeared in the June number of this magazine I have met with Mr. J. Blackwall's work, entitled "Researches in Zoology." In this book are recorded some interesting observations on the habits and economy of spiders. The spinning of an Epëira's web, which process I partially described in my last article, is there given in detail, and the fact that there are three kinds of threads in a spider's web is also noted. I mention this, to show that although my description is not unlike that of Mr. Blackwall, it was drawn up from independent observation and in ignorance of his researches.

The mode in which a Ciniflo uses its calamistra is also described at some length in Mr. Blackwall's book, and after reading this I no longer doubt that the calamistra are used in the formation of the curly threads of the web. I have never yet been fortunate enough to witness the process, for, notwithstanding that I have been keeping several Ciniflos for some weeks past, I have only once caught one at work, and then immediately on my bringing a candle by which to see her operations she ceased working.

Mr. Blackwall states that the "fourth threads" of a Ciniflo's web are "fibrous." By this expression I understand him to mean that they are made of loose fibre like floss-silk. His reasons for this supposition are, that the "film," while being spun, does not catch in the calamistra, nor will it afterwards adhere to a smooth surface, such as the bulb of a thermometer. Therefore it must be dry, because, if fluid, like the viscid globules of an Epëira's web, it would both catch in the calamistra and adhere to the polished glass.

I have noticed that a new web is loose in texture, and of a light blue colour, and that it adheres most tenaciously to any insect which may touch it. When old it is hard, close-textured, white, and apparently dry. In this state it will scarcely adhere even to a fly forcibly pressed against it. By analogical reasoning, after the manner of Mr. Blackwall, it might be inferred that the film is not of a fibrous, but of a viscid nature, because, in course of time, it thus appears to dry up. But the phenomenon may be explained in another way. Supposing the film to be fibrous, its various fibres may, after a time, become entangled with each other, or as it were "felted" together. This supposition will also account for its change in hue, since the finely-divided fibres, which are only blue and semitransparent because separate, would naturally become white and opaque when condensed into a compacter tissue, for exactly the same reasons that milk diluted with water appears sky-blue colour, because its oil-globules are finely subdivided, while pure milk is nearly white, its oil-globules being much closer together.

On examining a stained web with a power of about 300 diameters, and using oblique light, I can see what I should call fibres, if I *knew* beforehand that they were such. I believe that what I see are really fibres, but of course I may be deceived. I notice that the film as a whole can be torn lengthwise, which would naturally happen if it were composed of longitudinal fibres. Again, if viscous, one would imagine that it would be soluble in something or other. But I have tried eight solvents, and sulphuric acid is the only one that will act upon it. Since that acid also dissolves the other threads, this fact does not at all prove that the film is viscous or even gelatinous.

I confess that I was in error in stating that the fourth pair of Ciniflo's spinnerets have no papillæ, but are merely pierced with holes. With a specimen mounted in the ordinary manner (*i.e.* squeezed flat) in balsam, and with a quarter, or even an eighth-inch object-glass, it is impossible to say for certain that the openings are not mere punctures, with a black dot in the centre of each. On viewing a spinneret which has been stained, and so mounted in glycerine as to present the object sideways to the observer, the papillæ or spinning-tubes may be seen with a good glass. Fig. 125 is drawn with the aid of one of Ross's seventh-inch objectives, but the magnification has been increased fivefold; that is, the objective magnifies about 300 diameters, but for the sake of convenience I have enlarged the drawing to 1,500 diameters. Some of the spinning-tubes are shown sideways, some obliquely, and some as they appear when looked at directly from above. In the last case the tubes seen in the side view

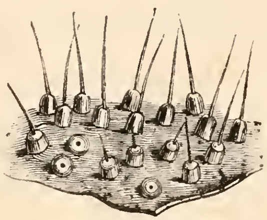


Fig. 125. Small portion of a fourth spinneret of *Ciniflo ferox* × 1,500 diameters, showing the spinning-tubes as they appear when viewed sideways and directly from above.

appear as dots in the centres of the papillæ. Spinning-tubes of a Ciniflo's third spinnerets, which are smaller than the corresponding tubes of an Epëira, shown at *b*, fig. 88, page 132, if magnified to the same scale as fig. 125, would appear to be about three and a half or four inches long. It may therefore be easily understood that these spinning-tubes of the fourth spinnerets are very minute indeed, their bases being, as I calculate, but about one-fifteen-thousandth of an inch in diameter. What may be the thickness (or rather the fineness) of the hair-like tubes through which the thread is expelled, and the thickness of the thread itself, I do not care to guess, but the latter must be so fine that it is no wonder I cannot certainly say that I see it. The plate on which these spinning-tubes are placed is very thin, as may be seen by cutting it across and viewing it edgeways.

It has been denied that these fourth spinnerets are spinnerets at all. I think that the finding of the glands belonging to them conclusively proves that they are such. It is true that I have never been able to trace a duct continuously from a gland to a spinning-tube, but one of my slides displays ducts arising from the glands, while another shows ducts inserted into the spinning-tubes. I may remark that the fact of this fourth set of spinning-tubes and glands being constructed on a plan essentially the same as that of the other spinnerets, makes it probable that the threads they produce should be similar in character to the ordinary threads, *i.e.* composed of many fibres.

The Preparation of Specimens for the Microscope.

This is more difficult than might at first be supposed; that is, it is difficult to prepare specimens which, without distortion, shall clearly show all the structural details; although mounting spinnerets as entomological objects are usually mounted is easy enough.

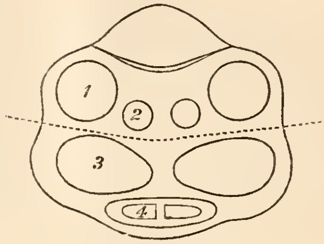


Fig. 126. Plan of the spinnerets of a Ciniflo, showing that they are to be divided into two sets when mounted. 1, 2, 3, 4,—1st, 2nd, 3rd, and 4th pairs respectively.

It is, of course, necessary to have specimens mounted in several different ways. I will suppose that the first requirement is to display the exterior parts alone. To commence with dissection: Cut off the tip of the abdomen with a pair of scissors. Lay the severed tip, spinnerets uppermost, on a glass slide under a dissecting microscope, and with a scalpel divide it, as indicated by the dotted line in fig. 126. This figure is a plan of the spinnerets of a Ciniflo, and the reason for dividing them is, that it is difficult to show the spinning-tubes and the natural shape of the spinnerets at the same time if all the six are left on one piece. When dissected, the spinnerets are to be soaked in liquor potassæ for one day, and then boiled for about ten seconds in a fresh supply of the same. Next boil them in two successive lots of clean distilled water to get rid of the alkali. After this they should be stained, say with anilin-blue fluid, and washed in alcohol. Then soak them for half an hour in absolute alcohol, and transfer them from this to oil of cloves, in which they may be kept until wanted. They are now ready for mounting in balsam. They must on no account be squeezed flat, for a flattened specimen gives no idea of their natural form and beauty. Lay the upper set, carefully arranged, on a glass slide, with the inner (that is, the under) side uppermost. This is because the spinning-tubes are on the under side. Opposite to them place the under set with the outer (which in this case also is the under) side uppermost. Arrange in the form of a triangle around the spinnerets three bits of cover-glass, just slightly thinner than the object. (See *a*, fig. 127.) These are as supports for the cover, to prevent its unduly pressing on the specimen, which it should just touch, in order that the balsam may not wash it away. Put on the cover, secure it with a clip, and let the balsam run under by capillary attraction. Leave the preparation two or three days before taking off the clip, and then you will find that you have a slide with no air-bubbles, with the object not only in the centre, but also not flattened, nor yet reduced to a glass-like transparency by the agency of heat. All these desirable points have been attained with far less trouble than if a cell had been used. Spinnerets look as well in glycerine as in balsam, not to say better, only it is more trouble to mount them in this medium because it necessitates the use of a cell. I should mention that the balsam used must be liquefied by the addition of chloroform or benzine: I prefer the latter.

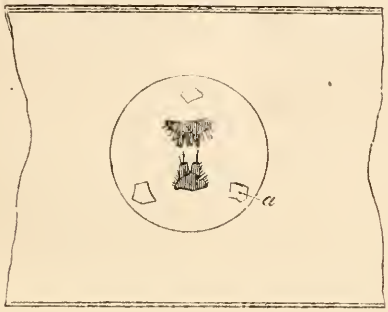


Fig. 127. Diagram illustrative of the method of mounting spinnerets, showing how they are to be arranged on the slide, and how the glass cover is to be prevented from unduly pressing them, by being supported on three bits of cover-glass (*a*).

The demonstration of the silk-glands requires a little care, and I have never yet prepared a slide that I am proud of. The reader will more easily understand the description which follows if he will examine fig. 128, which shows where the silk-glands are to be sought for. It will be seen, that, taking up so much space as they do, there is no chance of overlooking them. As the figure is only meant to indicate the position of the silk-glands, I have not verified, by copying from a fresh dissection, the exact position and shape of every organ, and although it represents the interior of the abdomen fairly well, I do not pretend that it is quite accurate. After many trials, I find that, on the whole, the following method gives the best results. First sever the abdomen from the cephalo-thorax, and then skin it, leaving only the pulmonary chambers and spinnerets *in situ*. The organs shown in fig. 128 cannot yet be seen, being hidden by the liver, which occupies the greater part of a spider's abdomen, and in which the other parts are mostly imbedded. This and the heart must be carefully taken off, and the eggs (if any) removed. The dissector will now have the breathing, part of the digestive, and all the silk-secreting apparatus exposed to view. As we are only treating of the last, we will pass the others by. Spiders have arteries but no veins, therefore the silk-glands are not attached (by blood-vessels) to any part, but lie free, bathed in the blood, from which they derive the elements of their secretion. They must be carefully disentangled from the other organs, taking care that the large glands, described in the June number at pages 134–5, and shown at *c*, fig. 128, are not left behind. The spinnerets are to be divided as in fig. 126, with a pair of scissors, and the two sets carefully separated without pulling off the glands which belong to each.

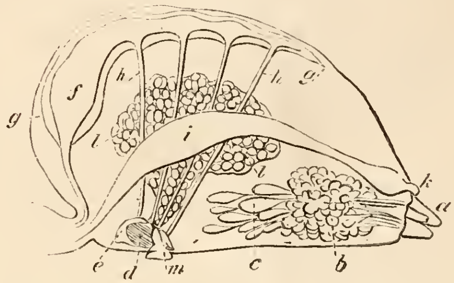


Fig. 128. Section of a Spider's abdomen, showing the position of the silk glands in relation to the other organs: *a*, Spinnerets; *b*, Silk-glands; *c*, Large glands; *d*, Pulmonary leaflets; *e*, Pulmonary chamber; *f*, Heart; *g g*, Pericardium; *h h*, Vessels by which the blood is returned to the heart; *i*, Alimentary canal; *k*, Anus; *l*, Ovary, containing eggs; *m*, Termination of the oviduct.

They should be soaked in common acetic acid for about three days, which will make them transparent, and afterwards washed and allowed to soak in distilled water, which should be changed two or three times to make sure that no acid remains. It is necessary to stain the glands in order to bring out the nuclei of the epithelial cells, the ducts, and other minuter parts. There are many staining fluids in use, among which I may mention carmine, hæmatoxylin, and anilin-blue. Recipes for these may be found in any book treating of the preparation of medical objects. The spinnerets and glands must be mounted in a cell with glycerine; Canada balsam is simply "ruin" to the glands.

A few words respecting mounting webs may not be out of place. Not many are sufficiently interesting to be permanently preserved, but a few (the web of Ciniflo in particular) are worth the trouble. They should mostly be mounted dry, and to get the web nicely spread out on the slide, the glass slip should be taken to the web and not the web brought to the slip. Rough-edged slips are the best to use, because the web catches in the edges. A Ciniflo's web may be stained, if previously wetted with alcohol. It must not, however, be removed from the slide where first placed, for it cannot be spread out neatly a second time. Glycerine is the best medium in which to mount it, but no cell is necessary, and the thinnest covering glass should be used, to admit of examination with the highest powers.

I hope these few hints towards preparing specimens may induce others to take up the subject, and give us the benefit of their observations in SCIENCE-GOSSIP.

Oxford. H. M. J. UNDERHILL.

THE PIRATE-BIRDS OF THE NORTHERN SEAS.

AWAY across the vast expanse of waters that roll perpetually throughout the dreary region extending from the desolate shores of Iceland to the neighbourhood of the Western Islands, the Arctic Gull may frequently be discerned gliding, with arrow-like rapidity, through the air. The spectator of his dashing movements stands in admiration thereat; while the dull, yet lustrous whiteness of his breast contrasts with the greyish-blueness of the sea. Few would surmise the deed which is being perpetrated by the bird, or believe that this interesting creature could be guilty of that which, if laid at the door of a human being, would be regarded as a gross sin. Nevertheless, our gull commonly exhibits a predilection to convert the property of his neighbour to his own use, thereby exhibiting a practical illustration of the maxim "Might is right." As he wheels about, or dashes briskly through the air, he is frequently observed to suddenly pounce down upon some unfortunate member of that voracious band of gannets, gulls, terns, &c., which at certain seasons of the year assiduously attend upon the herring-shoals, then prevalent, and forcibly compel it to relinquish the prey just captured. What a strange provision of nature! one might exclaim. Why may not the bird provide himself with his own appropriate sustenance, and not seek to deprive his neighbours of their honestly obtained reward? The bird relies confidently upon the competency of his physical endowments, and upon seeing tempting food in the mouth of another species, he elects to seize and possess himself of it, rather than to trouble himself about procuring it otherwise. The body of these birds is constituted of stronger materials, and furnished with more powerful and adequate predatory implements (beak, claws, &c.) than other members of the great family of the *Laridæ*. An extensive endowment of vital energy, and a personally acquired experience, doubtless co-operate therewith in the production of this steady, unblushing confidence. It may be, that this bird discharges the office of a *natural* corrective, or restriction upon what might prove dangerous appetites, or "gourmandish" propensities. We have heard it propounded that the actions of the lower animals may nearly all be referred to the class denominated *sensori-motor;* and if so, then we may presume that the attraction generated by the sight of the bait above indicated inevitably produces the action of seizure thereof.

The genus *Lestris* comprises almost the whole of the piratical sea-birds of the Northern Seas. This genus is distinguished from the other genera of the sub-family *Laridæ* by the generally stronger and more compact build of the animals it comprehends; by their possession of a stout, hard, cylindrical, very compressed, serrated and hooked bill; by their tarsi being long, and marked above the knee, and by their feet being covered with rough scales (entirely palmated), having very large hooked nails. The tail, moreover, is slightly rounded, and the first quill-feather of the wings is the longest. If we compare this list of characteristics with those commonly recognized as typical of the more terrible *Raptores*, we shall observe manifold points of analogy between them. A resemblance, moreover, holds with respect to the character of their food; for any animal substance seems to be equally intensely relished by both parties. As an illustration of this carnivorous proclivity on the part of the Gull, we may cite the fact, that Mr. Richards, of H.M.S. *Hecla*, saw, in the year 1823, an Arctic gull feeding upon the remains of some young children, whose graves had been demolished by a thaw.

A few species of the great genus *Larus* may also be adduced as illustrations of birds specially addicted to the piratical mode of warfare already mentioned. In particular, the great Black-backed Gull (*Larus marinus*) has been frequently noted for its habit of closely watching the lesser gulls, in order to appropriate to itself whatever edible booty they may happen to have captured. This is a noble bird; but as it is observed more frequently along the coast than in the midst of the ocean, a particular description of its characteristic marks scarcely comes within the limits of my subject. I may, however, mention that in addition to its enlarged size, it possesses a strong, straight, incurved bill; that its legs are placed near the centre of the body; and that its volatile apparatus is powerful and well-developed.

I may observe, that great vagueness and confusion have been introduced into the science of ornithology by reason of an absence therefrom of any systematic method of investigation upon its subject-matter. Sea-birds are especially liable to variation in respect of colour, plumage, &c., according as the span of their vital existence has been short, medium, or long. A naturalist, who at one period observes a certain bird while it is very young, and baptizes it with a certain name (*e.g. Larus nævius*), may, while inspecting that identical bird when it is three or four years older, think it a new species, and crown his efforts by a second baptism under another appellation (*e.g.*, *Larus marinus*). The principal characteristic features of the sea-bird known under the name of the Arctic Gull (*Lestris* or *Stercorarius parasiticus*), are as follows;—Front (including the throat, the region below the eyes, the neck, breast, belly, and abdomen) is of a pure white colour; the head is crowned by a blackish-brown hood; the feet are deep black; and the lower coverts of the tail, the back, wings, and caudal feathers (two of which extend much beyond the others), are of a deep ashy-brown colour. The total length of the bird is about 14½ inches.

Several other species of this genus, *e.g.*, *L. Richardsonii*, *L. pomarinus*, *L. Buffonii*, &c., are likewise distinguished by the practical demonstration of piratical propensities. Want of space, however, and the fact of their being distinguished from the foregoing by comparatively unimportant peculiarities, will prohibit my entering into a minute examination of them. It may be better for me to endeavour to deduce a few general propositions from the facts above stated.

1. In the first place, it may be observed that a very little contemplation of the habits, method of living, and physiological structure of any of these birds (*e.g.*, *Larus marinus*), convinces us that their corporeal constitution is eminently adapted to the birth and maintenance of a vast amount of animal force. The immense expenditure of physical power involved in the demonstration of their pugnacious inclinations, in their rapid and continuous flight, and generally in their restless, insatiable method of comporting themselves, must assuredly be somehow or other compensated for. Now it seems to be a fact clearly recognized by physiologists, that the blood constitutes the great storehouse of animal activity. It circulates extensively through the nervous centres, thereby furnishing them with an adequate opportunity of performing their extraordinary function of converting it into a corresponding amount of the nervous force that ministers to the actions of the muscular apparatus, &c. The point which I wish to draw special attention to is, that this energy or power is not accumulated and laid up in the centres for future expenditure, but is evolved out of the blood, according as it is *immediately* required for service. Hence it follows that if the animal is to be preserved in a healthy and fresh condition, its blood must be thoroughly adequate to meet all demands upon it, however exorbitant these may be. But in order to the accomplishment of this effect, it is indispensable that the blood should be well charged with fibrin and red globules. The wild Indian of the prairie, who subsists on nothing but animal food, presents an illustrative specimen of powerful animal energy in conjunction with a savageness and ferocity of disposition. In order, however, to the maintenance of this highly animalized condition of the blood, an extensive digestive and assimilative power is absolutely necessary.

2. Hence we may be justified in concluding that the members of the genera *Larus*, *Lestris*, &c., are distinguished by the possession of thoroughly adequate and effective masticatory and digestive organs. Birds, it is well known, possess three stomachs; viz., the crop, furnished with mucous and salivary glands; the *ventriculus succenturiatus*, provided with glandular bodies which secrete gastric juice; and the gizzard. In the predaceous birds it has been observed that this last is scarcely, if at all, developed. Hence we may presume that the second stomach is especially well developed in the species of sea-bird now under review.

3. The powerful beak and claws operating in conjunction with the muscular strength, and the total destitution of diving apparatus, combine to render our birds essentially of a piratical nature. Experiencing keenly the cravings of appetite, and totally unable to satiate it by the ordinary method of diving, they determine to utilize the savage brute force which they feel themselves indubitably possessed of. A fresh fish just caught, exhibited in the jaws of some of their more gifted neighbours, proves rather too strongly tempting for our friend, and he scruples not to pounce down upon it, and, supported by his great physical strength, he generally manages to carry off the prize in triumph.

I have endeavoured above to solicit attention to a rather extraordinary proceeding by way of gaining bodily sustenance practised by a highly interesting genus of the order Natatores. In order, however, that a thorough elucidation of the bearings and importance of my subject may be furnished, it is necessary to distinguish the phenomenon now indicated from sundry others of an analogous character, which sometimes occur amongst the Mammalia. Lions, tigers, bears, &c., may at times by reason of their overwhelming muscular force seize and appropriate the edible matter which some of their weaker brethren had just commenced to enjoy; but at the same time (unlike the Jager Gulls) they are eminently capable of directly capturing it for themselves.

In conclusion, I cannot refrain from expressing my sentiments relative to the mental elevation and supreme pleasure engendered by a study of the Natatorial order of birds. Intimately associated with that element of Nature whose vast extent and power have ever struck men with astonishment and terror, the study and observation of these birds must inevitably tincture the mind with wholesome influences. The broad ocean, the azure or cloudy sky, the rugged cliffs, and gigantic precipices, furnish a series of spectacular effects whose influence upon the mind has always tended to engender a spirit of devotional awe. The months of August and September may be especially mentioned as suitable periods for the prosecution of practical studies in this interesting department of natural history. The coasts of Scotland, and the northern shores of England and Ireland, are the localities particularly favourable for the lover of sea-birds. At these times, and at these places, the observation and capture of many magnificent specimens of Arctic Gulls (in their young state, as the "Black-toed Gull" of some authors), Northern Divers, Fulmar Petrels, Terns, Skuas, &c., will doubtless crown all persevering efforts with a noble reward.

P. Q. KEEGAN, LL.B.

THE COLORADO POTATO BEETLE.

I NOTICED in the June number of your SCIENCE-GOSSIP a suggestion that some American might send some specimens of the Colorado Potato Beetle (*Doryphora decem-lineata*) to England, to enable entomologists to recognize them should they appear there; and I also noticed, in the first number of 1874, an article in which, though in the main correct, there were yet some mistakes which might mislead such as have never seen the beetle in its different stages; and further, your correspondent has perhaps overdrawn the damage they are doing, for, although they have been here for three years, and have this year reached the Atlantic coast, yet we have succeeded in raising very good crops of potatoes.

The most satisfactory article I have seen upon the subject may be found in Dr. Fitch's ninth Report on the "Noxious Insects of New York," from which I will quote the following description:—

"The female in confinement drops her eggs in little clusters upon the [under side of the] leaves on which she has been feeding. The eggs are bright yellow, smooth and glossy, 0·06 in. long and 0·035 in. broad, of an oval form, with rounded ends. The larva, when full grown, is over half an inch in length, and half as thick, being thickest back of the middle, and tapering to a point at its tip. It is a thick plump grub, strongly arched above, and, when viewed on one side, its outline is nearly the form of a crescent. The head is small and much narrower than the body, and is of a flattened spherical form. Its mouth is furnished with short conical jointed feelers and large jaws, which are blunt at their ends, with little sharp teeth like those of a saw. Immediately above the mouth, on each side of the head, is a small conical pointed projection, which is the antenna. The thorax has a large transverse space, on the top of the first ring, of a firmer and somewhat coriaceous texture, and broadly margined with black on its hind side, and with dusky at each end. The abdomen is the thickest part of the body, and is distinctly divided into nine segments: it is very plump and rounded, but flattened on its under side; it gradually tapers posteriorly with a conical point, the apex of which is blunt, and serves as a fore leg, two small vesicular processes, on its lower side, at the end, serving as feet. There are six legs, placed anteriorly upon the breast, each leg being composed of three joints, and ending in a small claw.

"The larva is of a pale yellow colour, often slightly dusky, or freckled on the back, with minute blackish dots, and along each side are two rows of large black dots, those of the upper row larger, seven in number, and are not continued on the thorax, or the last abdominal ring. Each dot has a small breathing-pore in its centre.

"The head is black and shining, and more or less mottled on the face, with a dull yellowish colour. The neck, or first ring, has a black band near its hind edge. The second ring has also either a short black band or two black dots. The third ring usually shows two small black dots on its back. On the narrow tip of the body are two black bands, the anterior one having at its end, on each side, a small black dot, and beyond a large black dot, which is the last one of the lower row of dots along the side. On the next ring forward is a transverse row of six small dots, equidistant, in addition to the two large dots on each side, whereof the upper one is the last of the upper lateral row, and the lower, the penultimate one of the lower row.

"The legs are black, and often along the sides of the body; on the under side is a row of transverse black spots or clouds, and also a row of small black spots upon each side.

"The beetle, or mature insect, is 0·4 in. long and 0·25 in. thick, the female being slightly larger; it is of a regular oval form, very convex above, and flat beneath, of a hard crustaceous texture, smooth and shining, of a bright straw-colour, the head and thorax being sometimes tawny yellow, which is the colour of the under side; and it is dotted and marked with black.

"After death its colours often fade, becoming more dull and dark.

"The head is nearly spherical and little more than half the width of the thorax, into which it is sunk nearly or quite to the eyes. It is sprinkled over with fine punctures, and shows on the front an impressed medial line, and on each side of this a wide shallow indentation. On the crown is a triangular black spot, the nosepiece, or clypeus, occupying the space between the antennæ. It is nearly semicircular, is placed transversely, and is coarsely and closely punctured.

"The jaws are coarsely punctured, black at their tips, and have a slender black line along their outer edge. The tips of the palpi, or feelers, are dar brown. The antennæ reach nearly to the back of the thorax, when turned backwards. They are gradually thickened towards their tips; are twelve-jointed, the last joint being quite small, conical, and sunk into the apex of the preceding joint. The five first joints are pale yellow or tawny, obovate, the basal one largest, and the third one longer than either of the other three. The remaining joints are black and somewhat globular.

"The thorax is transverse, twice as broad as long, broadly notched in front for receiving the head, and its hind side convex. Fine punctures are scattered over its surface. These are more numerous and coarser towards the under sides. It is commonly margined all round by a slender black line. In the centre are two oblong black spots, which diverge forward; back of these is a small black dot, which is often wanting, and on each side are about six small spots, one towards the base of an oval form, and placed transverely, and two round ones nearly upon a line forward of this, the three being equidistant from each other; two towarde the hind angle placed close together aud often united, the inner one of these being the largest of the six, and the sixth one placed halfway between the two last and the forward angle.

"The scutel is dark brown. The wing-covers have the sutural edge dark brown, and five equidistant black stripes on each.

"The first or inner stripe is shortest, and tapers backwards as it gradually approaches the suture, terminating in a very long slender point a considerable space forward of the apex.

"The two next stripes are broadest, aud are united at their tips, beyond which they are sometimes prolonged into the end of the fourth stripe.

"The outer stripe is the most slender and longest of all, placed on the outer margin, but terminating before it attains the apex.

"The wing-covers are also punctured in rows extending along the margin of the stripes; the rows being uneven and the middle ones double; the outer interspace is also punctured. Beneath, the sockets of the legs are black, or edged with black, and on the hind breast is a transverse black spot, on each side, forward of the insertion of the hind legs, and also a black stripe on the outer margin of the hind breast, outside of which, on the parabura, is a triangular black spot.

"The abdomen is finely punctured on the disk and base, and has a short black band on the middle of the anterior edge of each segment except the last; and near the anterior margin a row of six black dots.

"The legs are tawny yellow, with the hips, at least of the hiud pair, black, aud also the knees and feet."

There is another beetle which resembles the *Doryphora decem-lineata* in size and general appearance, the *Doryphora juncta*, but which does not feed upon the potato. This may be distinguished from the *D. decem-lineata*, in the larva by the head being yellow and the neck black, and by having only a single row of dots on the side; and in the perfect beetle, the legs and feet are all yellow, with perhaps the exception of a black spot on the anterior part of the thigh.

The dark stripes on the wing-covers are accurately edged by a single row of punctures placed in a groove. The remedy which has proved most efficient against their ravages here has been Paris green (arsenite of copper), which is used by dusting it upon the leaves dry; or, what is preferable, on account of the liability of inhaling the poisonous powder, by adding a tablespoonful or two to a pailful of water, and sprinkling the vines with a common garden sprinkling-pot, keeping it well stirred up to prevent the substance from settling to the bottom.

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THE ANATOMY OF THE LARVA OF THE CRANE-FLY (*concluded*).

By A. Hammond.

BEFORE entering on a description of the nervous system of this insect, I will recapitulate some of what Burmeister says of this portion of the organization of insects in general.* He says: "The nervous mass is contained within a very delicate structureless and perfectly transparent membrane, the nervous sheath (*neurilemma*), which appears to be the mould of the entire nervous system, at least in insects." And with respect to its form he says: "It presents itself as a double cord, running along the ventral side, which, from segment to segment, is reunited by ganglia. Two of these ganglia lie in the head, one above the pharynx, the other beneath it, and together form the brain, whence pass the nerves of the senses to the eyes, antennæ, and oral organs. In the same way there spring from each of the successive ganglia a number of lateral branches, which are subjected to manifold differences, the three first of which pass to the legs, wings, and muscles of the thorax, those of the following ganglia to the muscles of the abdomen, to the posterior end of the alimentary canal, and to the organs of generation. The anterior portion of the canal, namely the crop and the stomach, has its peculiar nervous system, which is formed by several auxiliary ganglia lying in the head."

Following the lead here given, we will look first at the coverings of the nerves, for it appears to me there are two. The neurilemma is best seen in the finer termination, and I cannot add to the descrip-

* Shuckhard's Translation, p. 270.

tion of it given above. On the ventral cord, however, the ganglia, and the main lateral branches, there appears to be another and thicker envelope surrounding the neurilemma at some distance, and showing traces of longitudinal muscular fibrillæ. Between these two coats the terminations of the tracheal tubes, as already noticed, pass, and seem to ramify upon the surface of the inner one; a trachea on each side entering together with the main lateral nervous branches at every ganglion.

The usual double form of the ventral cord is, in this insect, replaced by a single one; whether this has arisen from the coalescence of two originally distinct cords I do not know, but I have frequently observed both in the larva and in the imago, a slight separation or split in the cord immediately above each ganglion, which gives me the impression that this might have been the case. It is furnished with twelve ganglia, two of which belong to the head, three to the thoracic, and seven to the abdominal segments. Of the two cephalic ganglia, which together form the brain, one lies above the œsophagus and the other beneath it, the two being connected by two large nervous trunks, which connect the upper with the lower, and embrace the œsophagus between them. Speaking of these, Burmeister says:* "I consider that which lies above as the cerebrum of the higher animals, the lower one, on the contrary, as the cerebellum, and indeed because, as in the higher animals, the nerves of the superior organs of the senses, viz. of the eye, spring from the upper ganglion, and from the lower one, on the contrary, the nerves of the mandibles, lips, and tongue proceed." I shall adopt, therefore, this nomenclature, and regard these two ganglia as the cerebrum and cerebellum respectively. The cerebrum consists of two ganglia or lobes, connected by a nervous cord, lying transversely across the œsophagus, and, so far as I have been able to trace them, the nerves which pass from it are as follows. A nerve originates from the anterior portion of each lobe and passes to the antennæ, giving off two branches, one of which arches over the frontal sympathetic ganglion, the other I have not been able to trace. Close to this another nerve arises, and proceeds to the antennal imaginal disc, where, I believe, it divides, one branch entering the future antenna of the imago, and the other, after passing along the lower border of the disc, again divides into two branches, one of which I have not traced, and the other forms a second arch in front of the first, joining its fellow of the opposite side in the central line of the œsophagus, immediately in front of the frontal sympathetic ganglion. From the point of junction a central nerve runs down the œsophagus, and either joins the frontal ganglion or passes beneath it, I am not quite sure which. A T fork is thus formed in front of the latter, which will be recognized in my drawing. From these branches others proceed to the labrum, and others again connect them with the first-named arches of the antennal nerves of the larva. Exterior to these nerves arise the much thicker ones which proceed to the optic imaginal discs, and form the optic nerves of the imago.

The cerebellum has three pairs of nerves, as follows:—a nerve arises from its anterior border on each side, and ends in a small ganglion near the base of the maxilla; another arises near this, and shortly divides; one branch passes backwards, and is distributed to the large muscles of the mandibles; the other passes forwards and again divides, one branch proceeding to the base of the mandibles, and the other I have not traced. The third pair of nerves arise from the ventral surface of the cerebellum, and passing forward they divide, one branch on each side, proceeding to the muscles before referred to as connected with the salivary duct, and the other terminating in a small ganglion, one of a pair situated immediately below the mouth, behind the mentum.

The three thoracic ganglia which follow the cerebellum send out each two pairs of nerves, one from their superior and one from their inferior or ventral surfaces; the former are distributed to the muscles of the segment, and the latter to the inferior imaginal discs, with, I think, a prolongation to the corresponding superior ones; but of this I am not quite certain. These are accompanied by the tracheal branches proper to the ganglia. The seven succeeding abdominal ganglia likewise send out each two pairs of nerves, the homologues of those last named, one directed forwards and the other and larger pair directed backwards. Both are distributed to the muscles of the segments to which they belong. With respect to the latter, I would observe that it almost immediately divides, the branches embracing the longitudinal muscles which flank the cord; one branch is joined by the trachea proper to the ganglion, and the other, after passing under the diagonal and succeeding longitudinal series of muscles, ends in a small ganglion, which may be found in the centre of the spaces between the conspicuous transverse muscles of the lateral bands, whence again smaller ramifications proceed to the longitudinal ones near the dorsal vessel, &c. Many of these small branches—perhaps all, if I could fairly see them—are accompanied by minute tracheæ; indeed the association of the tracheal and nervous systems seems to me a feature worthy of notice. The terminal ganglion of the cord, in addition to the nerves above mentioned, sends out two other large ones, which pass backward to the muscles near the anus. It is to be noticed that there are nine abdominal segments, but only seven abdominal ganglia. Are the ganglia

* Shuckhard's Translation, p. 272.

of the three last segments consolidated into this terminal one? and is this an approach to the state of things which we find in the larva of the Blow-fly, where the whole of the nervous system is, as Mr. Lowne states, collected in the anterior segments?

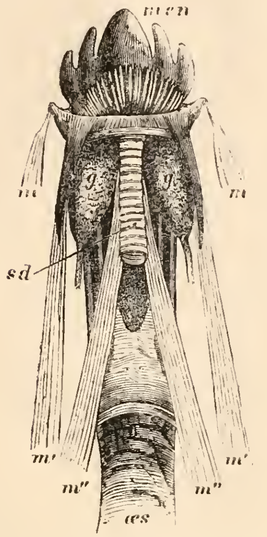
I have now to call attention to that portion of the nervous system referred to in the closing sentence of my quotation from Burmeister. In man and in the higher animals the viscera are supplied by a separate system of nerves and ganglia, connected with, but distinct from, the cerebro-spinal axis. It would appear that this is also the case in insects; Burmeister refers to it in the following terms:—"The sympathetic system is peculiar to all insects; but in the several orders it takes a different form: we may distinguish in it two main divisions,—a single cord, which runs upon the surface of the œsophagus and stomach, giving off delicate branches on all sides, and where the œsophagus passes through the brain running with the œsophagus beneath the cerebrum; and a double nervous web, consisting of ganglia, which originates on each side, by one branch from the posterior portion of the cerebrum, running down the œsophagus, and giving off here and there fine auxiliary branches to the single nervous cord." As this is a general description, we must not expect it to tally too closely with particular cases, nevertheless, the single cord is well marked, and is seen on the upper surface of the œsophagus, between the muscles which guard the orifice of the dorsal vessel. It commences with a small heart-shaped ganglion, called by Burmeister the frontal ganglion, situated immediately behind the three pairs of muscles already described as joining the œsophagus at this point with the upper internal surface of the head, and which is connected, as before stated, by two pairs of arching nerves with the cerebrum. It ends also in a rather smaller ganglion immediately beneath the cerebrum, from which a few fine filaments appear to connect it with what Burmeister, as above quoted, calls the second division of the sympathetic system, viz. "the double nervous web," though in the present case I scarcely recognize in it the character of a web, but that of two broad, flat, nervous expansions, originating, as he states, from "the posterior portion of the cerebrum," closely attached to the dorsal vessel, and occupied by very large nerve-cells. These are followed by two smaller nerves, which first bend a little forward and then again backward, along the course of the œsophagus, till they are lost on the muscular coat of the proventriculus.

I wish lastly to notice those portions of the organization of the larva from which the head and thorax of the future fly are developed. Mr. Lowne, in speaking of the formation of the pupa of the Blow-fly, says* that "all the tissues of the larva undergo degeneration, and the imaginal tissues are redeveloped from the disintegrated parts of the larva, under conditions similar to those appertaining to the formation of the embryonic tissues from the yolk." This development takes place within a delicate membrane called the pupa-skin, which envelops the whole of the future insect, and in the Blow-fly is inclosed within the last larval integument, which dies and forms around it a hard horny outer case. In the insect before us, however, the corresponding larval integument is shed when the larva reaches maturity, and the fly is formed within the pupa-skin alone, which becomes hardened to withstand the exposure.

This pupa-skin, Mr. Lowne says, is partly formed from seven pairs of delicate cellular expansions, called by Dr. Weismann imaginal discs, and partly from cells formed upon the inner surface of the larval integument, the head and thorax being formed in the former manner, and the proboscis and abdomen in the latter. Although Mr. Lowne mentions only seven pairs of discs, I think I have very distinctly made out eight in the Crane-fly, the additional pair being, I believe, the upper prothoracic discs, about whose existence he does not speak positively. Following his nomenclature, as adopted from Dr. Weismann, they will be as follows. The two pairs, viz. the antennal and optic, which enter into the formation of the head, and the six pairs which are concerned in forming the thorax and its appendages, viz., the upper and lower prothoracic, mesothoracic, and metathoracic discs. Of these the antennal and optic, and the three lower pairs of thoracic discs, are certainly connected, as before stated, with the cephalic and thoracic ganglia by means of thick nervous cords. I think that this is the case also intermediately with the upper thoracic discs, through one or more small nervous filaments connecting them with the corresponding lower ones. They are all inclosed within membranous capsules, which Mr. Lowne seems to regard as a continuation of the neurilemma of the nerves which support them. The antennal and optic discs are situated on each side of the œsophagus, in front of the cerebrum, and appear as flat cellular expansions lying in a vertical plane between the œsophagus and the great muscles of the mandibles. The inferior one is the antennal disc, and, when in an advanced state, shows clearly the indications of the joints as they appear in the pupa; the optic discs lie above these, and show the commencing areolation of, and deposition of pigment in, the future facets of the eye. The three thoracic discs are situated immediately beneath the ventral integument of the thoracic segments, and, when somewhat advanced, may be distinguished as whitish spots through the skin: they are concerned in the formation of the legs, which may be seen coiled round inside them, the several parts, viz. the coxæ, femora, tibiæ, and

* Lowne's "Anatomy of the Blow-fly," p. 116.

tarsi, being easily distinguishable: they appear to be ultimately released by the bursting of the capsules, and may be seen on the ventral surface of the pupa, packed closely side by side, and slightly attached to the surface by a sort of gummy exudation.



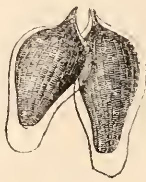


Fig. 130.

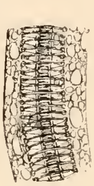


Fig. 131.

Fig. 129. The mentum and muscles attached from beneath: *men*, the mentum; *m*, levator; *m'*, depressor muscles of the mentum; *m''*, muscles connected with *sd*, the salivary duct; *gg*, ganglia; *œs*, the œsophagus. All slightly magnified.
Fig. 130. Portions of muscular fibre with myolemma, assuming a cellular form from pupa, × 50.
Fig. 131. Portion of trachea with outer and inner coats, the latter being doubled owing to the formation of a new ringed coat around the old one, × 210.

The three superior pairs of thoracic discs are found close to the former, but a little more removed towards the dorsal surface. The organs within them are not so easily distinguishable as those just mentioned, but they are, I believe, as follows. The superior prothoracic discs are concerned in the formation of the anterior thoracic spiracles, the corresponding discs of the mesothorax in that of the wings, and those of the metathorax contain the future halteres. I have not been able as yet to observe the growth of these organs within the discs, but my reasons for thinking so are as follows. It would appear that the organs of the imago which are subject to this mode of development are the appendages, inferior and superior, proper to the segment in which it occurs; and the question therefore seems to resolve itself into another; viz., which are the appendages proper to the segments in question. Now it is generally recognized, I believe, that the three pairs of legs form the three inferior appendages of the thoracic segments, and that the wings and halteres represent the superior ones of the meso- and metathorax respectively; with regard, therefore, to these last-named organs, I think there is little doubt that the above statement is correct; the only question in my mind is with regard to the development of the spiracles from the superior prothoracic discs, inasmuch as I am not quite certain whether these are to be regarded as the superior

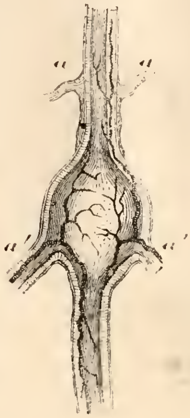


Fig. 132.

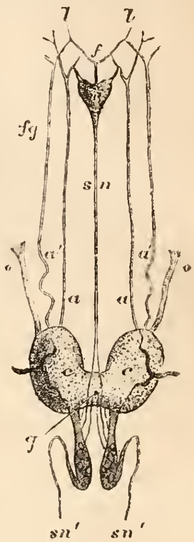


Fig. 133.

Fig. 132. One of the abdominal ganglia of the ventral cord, showing the outer and inner coats, the ramifications of the tracheæ between the two, and the two pairs of nerves arising from it at *aa* and *a'a'* × 120.
Fig. 133. The cerebrum and nerves attached from above: *cc*, the lobes of the cerebrum upon which tracheæ are seen to ramify; *aa*, the antennal nerves of the larva; *a'a'*, those of the imago. Both these are seen to form arches, one to the frontal sympathetic ganglion at *fg*, and the other to the fork above it at *f*; *ll* are branches to the labrum; *oo*, the optic nerves; *sn*, the single sympathetic nerve (nervus recurrens); *g*, the ganglion beneath the cerebrum connected by fine nervous filaments with the pair of sympathetic nerves *sn' sn'*, which arise from the posterior portion of the cerebrum, slightly magnified.

appendages of the prothorax. Now Mr. Lowne, though he does not speak positively on the subject, evidently regards the spiracles and their tracheæ as lateral appendages, like the wings and legs. This, therefore, tends to support my view, which is still further strengthened by an examination of the pupa, on which I find two club-shaped organs,* springing from the dorsal region of the prothorax, and which, from their form and position, I find it difficult to regard in any other light than as the appendages in question. Now, the main tracheæ in the pupa pass up the centre of these organs, emerging from the imperfectly formed spiracles of the fly beneath. I therefore regard them as the cases or sacs within which the spiracles are developed, in the same way as the wings, legs, &c., are formed within the cases proper to them; and as these result from the per-

* In the pupa of the gnat these organs are very conspicuous.

fected growth of the discs of the segments to which they belong, so I believe do the organs in question result, that of the superior prothoracic discs with which they correspond, and the spiracles of the fly as the imaginal appendages with the formation of which these discs are especially concerned. I may as well mention that I have noticed two minute nipples on the prothorax of the pupa-skin of the

Fig. 135.

Fig. 136.

Fig. 134. The cerebellum and nerves attached from beneath: *c*, the cerebellum; *pp*, the peduncles connecting it with the cerebrum; *th*, the first thoracic ganglion; *md md*, nerves to the roots of the mandibles; *md' md'*, branches to the muscles of mandibles; *mx mx*, nerves to maxillæ; *mt mt*, those to the mentum; *sd sd*, branches to muscles of salivary duct, slightly magnified.

Fig. 135. Cellular structure found beneath the abdominal integument of advanced larva, believed to be the future pupa skin, × 350.

Fig. 136. Inferior prothoracic imaginal disc, showing the coxæ at *c*, the femora at *f*, and tarsi at *t*, × 50.

Blow-fly, which I take to be the homologues of the organs just mentioned, though here they are quite rudimentary.

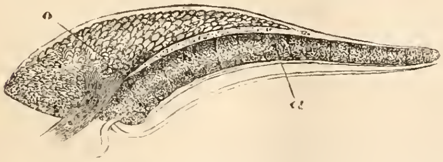


Fig. 137. The cephalic imaginal discs: *o*, optic; *a*, antennal, with nerves attached, × 50.

In conclusion I must notice some peculiar organs, the nature of which I do not at all understand. They consist of minute capsules filled with a granular fluid, and are situated in pairs, one pair on the dorsal and the other on the ventral surface of each body-segment, from the third to the tenth inclusive, immediately beneath the skin, through which they can be seen when the latter is sufficiently transparent. In the foregoing pages I have endeavoured to record such facts as have come under my notice, and in some cases the conclusions to which I believe they lead. The facts may, and probably have been, much better described before, and both facts and conclusions may contain errors which I would willingly see rectified; my object, however, will be accomplished if any of my readers will be sufficiently interested to examine the subject for themselves, and form their own conclusions thereon.

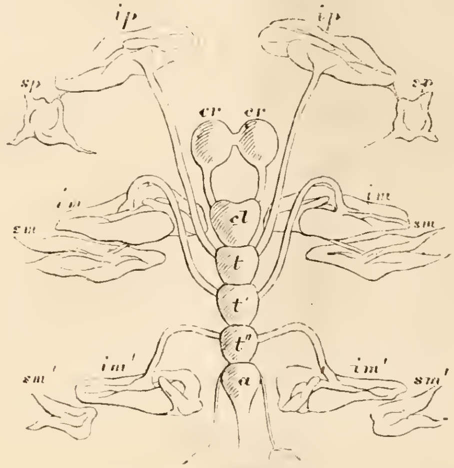


Fig. 138. The cephalic, thoracic, and first abdominal ganglia, with the inferior and superior thoracic imaginal discs, the former connected by nerve-trunks with the thoracic ganglia: *cr cr*, the lobes of the cerebrum connected by peduncles with *cl*, the cerebellum; *t t' t''*, the pro-, meso-, and metathoracic ganglia; *a*, the first abdominal ganglion; *ip sp*, the inferior and superior prothoracic imaginal discs; *im sm*, those of the meso-thorax; *im' sm'*, those of the metathorax.

MICROSCOPY.

Atlas der Diatomaceenkunde.—Parts IV. and V. of this work are now published. The author has thus far kept to the promise that six parts would be published in twelve months; the sixth part is to appear in September. Plate 13 continues the pandriform group of *Navicula*, of which forty-nine figures are given. Plates 14, 15, 16, 17, and 18 are devoted to the genus *Campylodiscus*, and contain 118 figures, some of them representing forms of exquisite beauty. Plates 19 and 20 represent twenty-five varieties and species of *Surirella*, most of them belonging to the *Fastuosa* group. One of these, *S. sentis*, from Campeachy Bay, represents one of the largest forms of this genus. The author inclosed a circular with the fifth part, in which he alludes to the promised list of figures corrected and enlarged, to replace those that have accompanied the issue of the plates, and he earnestly requests all who are interested in the study of the *Diatomaceæ* to inform him of any errors in the nomenclature, &c., of the genera and species figured: by this means he hopes to make the Atlas a powerful means of advancing the knowledge of the *Diatomaceæ*.

"Centerer" for Mounting.—The figure below is a sketch about half-size of my "centerer" for mounting objects truly. It is made of wood, a tolerably thick bed, thin sides; so that the bed, 3 in. by 1 in., just takes a slide; a card with a hole punched in the middle of it, over coloured paper, lies on this, and the slide is placed on it. An ec-

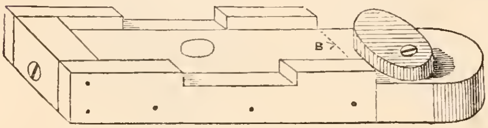


Fig. 139. Half-sized "Centerer" for mounting objects.

centric button keeps it steady. The depression at the sides allows a slide with thin glass on the under side to be inverted over it for dismounting, and pressed down, when a tap at one end will dislodge the glass, and leave it adhering over the object. The slide should not fit tightly in the bed: a variety of cards can be kept. I have found it very handy: any one can easily make one.—*W. Locock, Corscombe Rectory.*

Quekett Microscopical Club.—The tenth annual meeting of this flourishing society was held on the evening of Friday, July 23, at University College, Dr. Matthews, president, in the chair. The report of the committee congratulated the members upon the continued prosperity and progress of the club, and showed that during the past year much useful work had been accomplished. The meetings had been well attended, excellent papers had been read, field excursions had been made at frequent intervals with good results, and the library and cabinet were in a satisfactory condition. During the year five members had been removed by death, 23 had resigned, and 43 had been elected; the present numerical strength of the club being 530. Special allusion was made in the report to the lamented death of Mr. Robert Hardwicke, who had so long and ably filled the office of treasurer. The financial statement showed the year's income from all sources to have been £291. 13s. 11d.; and that, after payment of all liabilities, a balance remained in hand of £73. 9s. 9d. The president delivered the customary annual address, in which the aims and objects of the club were enlarged upon, and congratulations upon the past and present were happily intermixed with excellent advice for the future. Votes of thanks to the president and officers (some of whom were specially mentioned on account of exceptional services) were unanimously carried, as was also a most cordial vote of thanks to the council of University College, for the continued privilege of holding the meetings of the club in the library of that building. The ballot for the election of officers for the ensuing year then took place, with the following results:—As president, Dr. Matthews; as vice-presidents, Messrs. Frank Crisp, R. T. Lewis, B. T. Lowne, and T. C. White; as treasurer, Mr. F. W. Gay; as hon. sec., Mr. J. E. Ingpen; as hon. sec. for foreign correspondence, Dr. M. C. Cooke; and to fill four vacancies on the committee, Messrs. M. H. Johnson, F. Oxley, T. Rogers, and Joseph A. Smith.

ZOOLOGY.

A Grampus.—A fine specimen of grampus was captured in the river off Cargreen, Cornwall, on Saturday, 19th of June, 1875. It measures 14 feet in length and 7 feet in girth before the dorsal fin; the tail is 4 feet wide, and the weight is calculated at about one ton. It took four boats and twenty men to effect the capture, after several wounds had been inflicted by gunshots.

Thread-spinning by Slugs.—Your correspondent R. S. Terry alludes to a slug spinning a thread. This is no uncommon phenomenon with two species of our native Limaces. The one thing that particularly attracted my attention was the colour of the animal, viz. white. In England we have, as I think, eleven species of so-called slugs. 1. *Arion ater*, 2. *A. hortensis*, 3. *A. albus* (No. 3 is by many authors considered very doubtful), 4. *Limax gagates*, 5. *L. marginatus*, 6. *L. flavus*, 7. *L. agrestis*, 8. *L. arborum*, 9. *L. maximus*, 10. *L. brunneus*, 11. *Testacella haliotidea*. This last is only a slug in appearance externally. Of all these the only two that I am aware of being able or ever forming a thread, are *Limax arborum*, which more especially lives on beech trees, and it lowers itself gradually and with care, forming its thread from the mucus or slime which envelops the entire body. Jeffreys' description (and very correct it is):—"Body rather slender, gelatinous, sea-green or bluish-grey, with irregular yellowish-white spots, indistinctly streaked with a darker colour down the sides, having a lighter stripe in the middle from the shield to the tail, finely wrinkled." It evidently thus uses this rope to search for fresh pastures rather than take the trouble of travelling back to the main trunk, and then selecting some branch. The other species which I have seen suspended by these threads is *Limax maximus*, Linn., syn. *cinereus*, F. and H., which only uses the thread at the pairing season, and they generally conduct this operation in the evenings of damp weather. I have thus seen them suspended from the lower branches of fruit-trees, as also hanging on the faces of walls and rocks. The *Limax arborum* also suspend themselves during the act of procreation. I have also a faint idea that I have seen *L. flavus* suspended, but of this I cannot speak certainly, and I think that the mucus of this species would not be sufficiently viscid to sustain this animal unless it underwent some change for a special purpose. *L. maximus* is easily to be distinguished from *L. arborum* by its greater opacity, and being covered with large, dark, irregular blotches of colour. For some years I have taken great interest in these animals, which are not generally favourite objects of study, and have come to the conclusion that no others are capable of forming threads. I imagine your correspondent's specimens must have been a variety of *L. arborum*. —*John E. Daniel.*

The Congo "Snake."—This curious animal, about which there is an interesting account in the August number of Science-Gossip, is by no means a snake, though so called, but a true saurobatrachian, closely allied to the Proteus and Siren, though these last two have permanent gills, while the Congo Snake has deciduous gills. And this fact cannot be too much insisted on, because the red corpuscles of the blood of the Congo Snake (*Amphiuma tridactylum*) are the largest; whereas in our books of comparative anatomy the largeness of those corpuscles in Batrachians is incorrectly asserted to be related to the permanency of the gills. The Amphiuma at the Regent's Park is between two or three feet in length, and as thick as your waist, having grown at least six times larger than it was when first received there. It is carnivorous, and feeds freely, and spends most of its life in the water. The other species, which has only two fingers to each limb, was originally described under the name of *Amphiuma means* by the illustrious Cuvier, and from a recent note by Mr. Sclater in *Nature*, would seem to be accepted as a distinct species; but Tschudi and other eminent zoologists regard it as merely a variety of *Amphiuma tridactylum*. At present, however, we know too little of these curious creatures to be certain on this and on many other points relating to them. In the notice already quoted from Science-Gossip, the words Axolott and Sirenian are misprints for Axolotl and Siredon. Axolotl was the name first given, probably from a native name, to the animal now well known to zoologists as *Siredon mexicanum*, or *Siredon axolotol*, which of course has nothing to do with any "Sirenian," this last belonging to the group of herbivorous cetaceans.—*G. G.*

Gold-fish Breeding.—Replying to W. Elliott, in the June number of Science-Gossip: To breed gold-fish in any numbers your pond ought not to be less than 8 ft. wide and 2½ ft. deep, with a smaller tank 2 ft. deep near the centre, for the fish to go in when the pond is cleaned out. The following plants should be placed in the pond: three of *Valisneria spiralis*, two of the Water-soldier (*Stratiotes*), two of the Water-lily, and three plants of the *Anacharis*, which is the best plant I have discovered for a pond that will cause gold-fish to breed in it. The fish will always find food where the Anacharis grows, and will eat it, hide in it, and spawn on it. I lent a gentleman a self-air-acting can some five years ago to bring home two dozen of gold-fish from Paris. I was to have half the fish for the loan of the can. Two dozen were put in the can at Paris; only nine fish arrived safe: I would not take any of the fish from him, as he was making a new pond, and I was fitting up a fresh-water and a salt-water aquarium for him. I placed two of the smallest of the gold-fish in the fresh-water aquarium; the remaining seven gold-fish I placed in the new pond. The fish lived all right, but did not spawn in the pond. The gentleman came to me some eighteen months after, saying he could not get the fish to spawn. I asked him if he had placed any plants in the pond, and he said he had not; whereupon I told him he could not expect to get the fish to spawn if no plants were in the pond. I asked him to allow me to place six plants in the pond, and was allowed to do so, and placed the following six plants: one *Valisneria spiralis*, one Water-soldier, two Water-lilies, two *Anacharis*, all in plant-pots surrounded with rockery to keep them steady. Some time after I visited the pond, and found the plants growing most beautifully, particularly the *Anacharis*. I did not see the pond again for some months, when the gentleman sent for me, and we visited the pond together. I found the pond full of young gold-fish. There were thousands of them. We got a dip-net, and thinned them out for a minute; the gentleman did not like to destroy them in that way, so another large pond was built, and the fish thrown into it. Thousands of fish have been given away from these ponds. The *Anacharis* plants when grown too large should be taken out twice a year. When the plant has grown too long, nip off some of the young sprouts, and place them in some fresh earth in pots, to replace the old plants, which may be thrown away. This plant grows very fast. I would not recommend it for a very large pond or sheet of water, as it will soon choke it up, unless swans are kept there. Those birds feed on it, and thrive well. I think our aquarium tanks are too small for the spawn of gold-fish to come to anything. I kept a large tank for twelve years, and never got any young gold-fish from their spawn, after trying all sorts of ways. To keep the gold-fish healthy in the aquarium you must only give them a small fly or a small red worm; if you can get enough plants of

Valisneria, do not place in any others. Above all things do not give the fish biscuit, bread, or meat, as it will cause a disease in the fish. The fish like a little gravel at the bottom. They take it in their mouth occasionally; it does them good, and cleans the mouth of the fish.—*A. J. R. Sclater, Teignmouth, Devon.*

Capture of Deilphila Galii.—It may be interesting to your entomological readers to hear that I took a fine specimen of the Bedstraw Hawk-moth (*D. Galii*) darting about a bed of the common larkspur, in a garden near this city, on the evening of the 7th August.—*R. Laddiman, Norwich.*

BOTANY.

Winter Shrubs.—Alluding to the horticultural article on shrubs that have been spared during last winter at Brighton, I may add to the number of those saved, the *Veronica spicata*. Five of these very handsome plants, which four years ago were raised from cuttings, have survived the frost in my garden at Chatham-place, near the Dyke-road. They continued in flower from July to January, not seeming much affected by the rigid climatal conditions of December. But in February they began to droop, and looked wretched. Now (April 11) they are, after due pruning, assuming their vernal garb, and in a couple of months will present their charming display of blue spikes, not rivalled by many of our summer-flowering shrubs. In a back-garden with a north aspect, several of these veronicas that had stood two winters, have been entirely destroyed during the last.—*W. E. Heathfield.*

New Discovery in connection with the Potato Disease.—There has been hitherto one "missing link" in our knowledge of the life-history of the potato-blight, *Peronospora infestans*. The non-sexual mode of reproduction by conidia or zoospores has long been known; but the sexual mode of reproduction has eluded observation. This link has now been supplied through the researches of Mr. Worthington Smith, the well-known fungologist, who described his discovery in a paper read at a recent meeting of the Scientific Committee of the Royal Horticultural Society, and published at length in the *Gardener's Chronicle* for July 10. He finds the female organs, the "resting-spores" or unfertilized "oospores," and the male organs or "antheridia," in the interior of the tissue of the tuber, stem, and leaf, when in a very advanced stage of decay; and he has actually observed the contact between the two organs in which the process of fecundation consists. In some remarks made at the meeting of the British Association last year by one of our high authorities, it was suggested that we have in the *Peronospora* an instance of the phenomenon not infrequent among fungi, known as "alternation of generations"; and that the germination of the true spores of the potato-blight must be looked for on some other plant than the potato. Mr. Worthington Smith has, however, looked nearer home, and has proved that the suggestion is not at all events verified in all cases. After the lapse of a period of nearly thirty years since the publication of the first important memoir on the subject, this important practical discovery has fallen to one of our own countrymen, notwithstanding the foreign aid invoked by the Royal Agricultural Society in settling the still unsolved problems connected with this perplexing pest.

White and Red Varieties.—Of "White Varieties" of British plants we have in this neighbourhood:—Hemlock-Crane's-bill (*Erodium cicutarium*), Rest-harrow (*Ononis arvensis*), Clover (*Trifolium pratense*), Field Scabious (*Penantia arvensis*), Heath-pea (*Lathyrus macrorhizus*), Musk Thistle (*Carduus nutans*), Marsh Thistle (*Cnicus palustris*), Creeping Thistle (*C. arvensis*), Greater Knapweed (*Centaurea Scabiosa*), Round-leaved Bellflower (*Campanula rotundifolia*), Lesser Centaury (*Erythræa Centaurium*), Thrift (*Armeria vulgaris*), Eye-bright (*Bartsia Odontites*), Water-mint (*Mentha aquatica*), Hoary Plantain (*Plantago media*); and of *Red* varieties, besides such plants as Cow-parsnep, Carrot, &c., which are often red, Comfrey (*Symphytum officinale*), Yarrow (*Achillea Millefolium*), Greater Knapweed (*Centaurea Scabiosa*), and Self-heal (*Prunella vulgaris*), the two last a pale rose-colour.—*R. Dickenson, East Boldon, Durham.*

The Botanical Locality Record Club: a Suggestion.—Although in the rules of the above club it is not expressly stated that none but flowering plants and fern allies are received, yet both in the rules and in the report for 1873 (I have not yet received that for 1874) it seems to be tacitly implied that the investigations of the club are to be confined to the orders included in Watson's "Cybele Britannica" and the London Catalogue. With fifty-six new countal records in the report for 1873, it cannot be said that the distribution even of the phanerogamous plants is yet thoroughly worked out, especially as regards segregate species; but our knowledge of the distribution of the cryptogamia is very much less complete, and I believe that if the club were to embrace the whole of the vegetable kingdom, its opportunities of rendering distinguished service to the cause of British botany would be far greater than if confined, as appears to be the case at present, to a small proportion, and that the best known of the flora of these isles. The British Fungi alone are twice as numerous as all the species of flowering plants put together. The general laws which govern the distribution of plants would, in all probability, be far easier to trace among the perennial orders of cryptogams, such as mosses and lichens, than among flowering plants. The occurrence of the fungi and fresh-water algæ is, no doubt, governed more by accidental circumstances, such as the presence of the soil, and meteorological conditions necessary for their development, than by geographical position, but the mosses and lichens exhibit very marked uniformities of distribution in horizontal and vertical space. *Polytrichum sexangulare*, for instance, may readily be referred to the Highland, *Physcia flavicans* to the English, and many of the Jungermanniæ to the Atlantic type of distribution. Moreover it would be comparatively rare among the lower cryptogamia to find introduced species—aliens and casuals—and extinctions are hardly likely to occur. The objection which has been raised to the object of the Botanical Locality Record Club, as tending to the eradication of rare species by unscrupulous collectors, would not apply here, for mosses, lichens, algæ, and fungi are not likely ever to become a fashionable mania among the class of collectors whose destructive greed threatens to render a fern a thing of the past. I am aware that there are many difficulties in the way of the proposed extension, but none I would hope insuperable. It may be said that it would increase at least fivefold the already, I fear, arduous duties of the able recorder, that it would be too much to expect that any one botanist should have a critical knowledge of the species of every order. These difficulties might be readily surmounted by constituting each of the great orders of cryptogamia a special department under the care of a separate recorder. It may also be said that there is no standard catalogue of species to work by, like the London Catalogue of flowering plants; but the Rev. J. M. Crombie has published a catalogue of lichens, and Dr. M. C. Cooke one of fungi; and if the Botanical Society Record Club could bring about the compilation of similar catalogues for the other orders, it would render no mean service to British botany. Again, it may be objected that the harvest truly is plenteous, but the labourers are few. Perhaps so; but the students of cryptogamic botany are becoming yearly more numerous, and there can be little doubt that the prospect of being able to add a few stones to the temple of Flora would induce many to take up this branch of botanical science, or, having taken it up, to pursue it with fresh vigour. I for one shall be ready to add my mite to the general stock of knowledge.—*H. F. Parsons, Goole.*

Swiss and Italian Flora.—A correspondent, "C. F. T.," wishes to know the best works on Italian and Swiss plants. Perhaps some of our botanical readers will answer the query, and, if possible, state the prices and publishers.

GEOLOGY.

"The Probable Physical Conditions under which the Cambrian and Lower Silurian Rocks were Deposited over the European Area."—This is the title of a paper read by Henry Hicks, Esq., F.G.S., before the Geological Society of London. The author indicates that the base line of the Cambrian rocks is seen everywhere in Europe to rest unconformably upon rocks supposed to be of the age of the Laurentian of Canada, and that the existence of these Pre-Cambrian rocks indicates that large continental areas existed previous to the deposition of the Cambrian rocks. The central line of the Pre-Cambrian European continent would be shown by a line drawn from S.W. to N.E., along the south coast of the English Channel, and continued through Holland and Denmark to the Baltic. Its boundaries were mountainous; they are indicated in the north by the Pre-Cambrian ridges in Pembrokeshire, in the Hebrides and Western Highlands, and by the gneissic rocks of Norway, Sweden, and Lapland. The southern line commenced to the south of Spain, passed along Southern Europe, and terminated probably in some elevated plains in Russia. Between these chains the land formed an undulating plain, sloping gradually to the S.W., its boundary in this direction being probably a line drawn from Spain to a point beyond the British Isles, now marked by the 100-fathom line. The land here facing the Atlantic Ocean would be lowest, and would be first submerged, when the slow and regular depression of the Pre-Cambrian land took place. The author points out that the evidence furnished by the Cambrian and Lower Silurian deposits of Europe is in accordance with this hypothesis. In England they attain a thickness of 25,000 to 30,000 ft.; in Sweden not more than 1,000 ft.; and in Russia they are still thinner, and the earlier deposits seem to be wanting. In Bohemia they occupy an intermediate position as to thickness and order of deposition. The author discusses the phenomena presented by the Welsh deposits of Cambrian and Lower Silurian age, and shows that we have first conglomerates composed of pebbles of the Pre-Cambrian rocks, indicating beach conditions, then ripple-marked sandstones and shallow-water accumulations, and then, after the rather sudden occurrence of a greater depression, finer deposits containing the earliest organisms of this region, which he believes to have immigrated from the deep water of the ocean lying to the S.W. After this the depression was very gradual for a long period, and the deposits were generally formed in shallow water; then came a greater depression, marked by finer beds containing the second fauna; then a period of gradual subsidence, followed by a more decided depression of probably 1,000 ft., the deposits formed in this containing the third or "Menevian" fauna. This depression enabled the water to spread over the area between the south of Prussia and Bohemia and Norway and Sweden, there being no evidence of the presence of the first and second faunas over this area. The filling up of this depression led to the deposition of the shallow-water deposits of the Lingula-flag group, followed by another sudden depression at the commencement of the Tremadoc epoch, which allowed the water to spread freely over the whole European area. The author next discusses the faunas of the successive epochs, and indicates that these are also in favour of his views. He indicates the probability that the animals, which are all of marine forms, migrated into the European area from some point to the south-west, probably near the equator, where he supposes the earliest types were developed. Both the lower and higher types of invertebrates appear first in the western areas; and the groups in each case as they first appear are those which biologists now recognize as being most nearly allied, and which may have developed from one common type. The lower invertebrates appear at a very much earlier period than the higher in all the areas. In the Welsh area the higher forms (the Gasteropods, Lamellibranchs, and Cephalopods) come in for the first time in Lower Tremadoc rocks; and with the exception of the presence of a Gasteropod in rather lower beds in Spain, this is the earliest evidence of these higher forms having reached the European area. At this time, however, no less than five distinct faunas of lower invertebrates had already appeared; and an enormous period, indicated by the deposition of nearly 15,000 feet of deposits, had elapsed since the first fauna had reached this area. The author points out also that a similar encroachment of the sea and migration of animals in a north-westerly direction occurred in the North American area at about the same time, the lines indicating the European and American depressions meeting in mid-Atlantic.

"ON THE SUPERFICIAL GEOLOGY OF THE CENTRAL REGION OF NORTH AMERICA."—This was a paper read at the same meeting by G. M. Dawson, Esq., Assoc. R.S.M., Geologist to H.M. North American Boundary Commission. *Physical geography of the region.*—The region under consideration is that portion of the great tract of prairie of the middle of North America from Mexico to the Arctic Sea, which lies between the forty-ninth and fifty-fifth parallels, and extends from the base of the Rocky Mountains to a ridge of Laurentian rocks that runs north-west from Lake Superior towards the Arctic Sea, and is called by the author the "Laurentian axis." This plateau is crossed by two watersheds; one, starting from the base of the Rocky Mountains at about the forty-ninth parallel, runs due east to the 105th meridian, when it turns to the south-east, dividing the Red River from the Missouri; the other crosses from the Rocky Mountains to the Laurentian axis near the fifty-fifth parallel. The whole region between these two transverse watersheds slopes gradually eastward, but is divisible into three prairie steppes or plateaus of different elevations. The lowest includes Lake Winnipeg and the valley of the Red River; its average altitude is 800 feet. The second, or the "Great Plains," properly so called, has an average elevation of 1,600 feet. The third or highest is from 2,500 to 4,200 feet above the sea, and is not so level as the other two. *Glacial phenomena of the Laurentian axis.*—The neighbourhood of the Lake of the Woods is taken by the author as furnishing an example of the glaciation visible in many parts of the Laurentian axis. This lake is seventy miles long, and has a coast line of three or four hundred miles. The details of its outline closely follow the character of the rock, spreading out over the schistose and thinly-cleavable varieties, and becoming narrow and tortuous where compact dioritic rocks, greenstone, conglomerate, and gneiss prevail. The rocks, both on the shores and the islands in the lake, are rounded, grooved, and striated. The general direction of the striæ is from north-east to south-west. *Drift plateau of Northern Minnesota and Eastern Manitoba.*—This plateau consists of a great thickness of drift deposits, resting on the gently-sloping foot of the Laurentian, and is composed, to a depth of 60 feet or more, of fine sands and arenaceous clays, with occasional beds of gravel and small boulders, probably reposing throughout on boulder-clay. The only fossil found was a piece of wood apparently of the common cedar (*Thuja occidentalis*). The surface of the plateau is strewn with large erratics, derived chiefly from the Laurentian and Huronian to the north; but there are also many of white limestone. The fossils in some of the latter being of Upper Silurian age, the author is inclined to believe, with Dr. Bigsby, that an outcrop of Upper Silurian is concealed by the drift deposits in the Lake of the Woods region. *Lowest prairie level and valley of the Red River.*—This prairie presents an appearance of perfect horizontality. The soil consists of fine silty deposits, arranged in thin horizontal beds, resting on till or boulder-clay. Stones were exceedingly rare. The western escarpment was terraced and covered with boulders. It is therefore probable that this prairie is the bed of a preglacial lake. The second prairie plateau is thickly covered with drift deposits, which consist in great part of local débris, derived from the under-lying soft formations, mixed with a considerable quantity of transported material, especially in the upper layers. Large erratics are in places abundant; they consist mainly of Laurentian rocks, but Silurian limestone also abounds. The following is the percentage of the boulders from the different formations present in the drift:—Laurentian 28·49, Huronian 9·71, Limestone 54·01, Quartzite Drift 1·14. The last is derived from the Rocky Mountains, the other three from the Laurentian axis. There are also on the surface of this plateau some remarkable elevated regions, apparently entirely composed of accumulated drift materials. The edge of the third prairie plateau, or the Missouri coteau, is a mass of glacial débris and travelled blocks averaging from thirty to forty miles in breadth, and extending diagonally across the country for a distance of about eight hundred miles. *Third or highest plateau.*—There is a marked change in the drift on this plateau, the quartzite drift of the Rocky Mountains preponderating, seldom showing much glaciation. Its general character may be seen from the following percentage of its composition: —Laurentian 27·05, Huronian ?, Limestone 15·84, Quartzite drift 52·10. Some of the lower parts of this steppe show thick deposits of true till with well-glaciated stones, both from the mountains and the east, and débris from underlying tertiary beds, all in a hard yellowish sandy matrix. On the higher prairie sloping up to the Rocky Mountains the drift is entirely composed of material derived from them. The Rocky Mountains themselves show abundant traces of glaciation. Nearly all the valleys hold remnants of moraines, some of them still very perfect. The harder rocks show the usual rounded forms, but striation was only observed in a single locality, and there coincided with the main direction of the valley. The longer valleys generally terminate in cirques, with almost perpendicular rock-walls, and containing small but deep lakes. *State of the interior region of the continent previous to the Glacial period.*—The author considers that previous to the glacial epoch the country was at about its present elevation, and that its main physical features and river-drainage were already outlined. Subaërial denudation had been in operation for a vast period of time, and an enormous mass of tertiary and cretaceous strata removed. *Mode of glaciation and formation of the drift deposits.*—The author did not find any evidence rendering the supposition of a great northern ice-cap necessary, but suggests that local glaciers on the Laurentian axis furnished icebergs laden with boulders, which were floated across the then submerged prairies towards the Rocky Mountains.

NOTES AND QUERIES.

Longevity in the Valley of the Usk.—A short time ago, when exploring the scenery about Crickhowel, I spent some time in the ancient church and churchyard of Llangattoc, less than a mile from the former village, and was struck by the number of very aged persons recorded on the stones; the most remarkable instance being that of three persons of one family, whose united ages amounted to 300 years! I saw most of the names and ages in the following list, which was subsequently furnished to me by Jenkin Jenkins, sexton and clerk of the parish, most of which he told me he had verified by the registers of the church:—Thomas Davies, farm-bailiff for one family for seventy-five years, 105 years old; father of the same, 101; mother of ditto, 94; Gueullen Morgan, 110; Edward James, 102; William Williams, 101; Henry Smith, 100; John Pugh, 99; Abel Thomas, 98; John Jones, 97; Charles Powell, 97; Catherine Williams, 96: average ages of 34 other people, 92; average ages of 161 other people, 84. Such remarkable length of many lives would indicate great healthiness of that locality.—*Horace Pearce, F.G.S.*

Cats and Music.—I can give another instance, from personal knowledge. A few years ago my brother had a favourite cat, which, when he whistled a tune, would follow him round the room, and climbing up him, touch his mouth with her paw, and rub her head against his face, all the time purring with pleasure. I may add that this musical taste is *not* hereditary, for a grandchild of this cat's now in our possession shows the greatest antipathy to music; a few notes on the piano or concertina are enough to rouse her from her slumbers on the hearth-rug, and drive her to the door, mewing loudly to be let out.—*E. J. T.*

Tails of Animals.—In the notices of the uses of animals' tails, I have not seen that of their being of essential service to some animals in guiding them when running fast. A greyhound cannot go after a hare so well if his tail be docked, as he cannot use it in turning about.—*E. T. Scott.*

Tails of Animals.—I saw queried in a recent number of the Science-Gossip the use of the tails of rats. I once kept a number of tame rats, and used to observe that, if running along a thin perch, they would twine their tails round loosely, but not so as to hinder their movements, and, if they slipped, they immediately tightened them so as to swing and save themselves from a fall. I have also seen them test a new perch by hanging by their tails from an old one, and shaking the other. When holding albino rats by the tail, I have had the skin of the tip of the tail left in my hand, while the rat has run off with the bone protruding, apparently unconcerned. Have any of your readers noticed this?—*W. L. M.*

Our kitchen closets are just now infested with long brown beetles. Can any of your readers tell us how to get rid of them?—*W. L. M.*

The Uses of Tails in Animals.—I have been much interested in the summary of Mr. Tait's lecture given in Science-Gossip for June. Among the puzzling forms of tails he mentions the bushy appendage of the fox. Six years this autumn I had a good opportunity to watch the habits of a tame red fox. I then satisfied myself that the chief use of the tail was to lie upon, to keep the feet and legs warm. In cool weather he always used his tail in this way, bending it in a close coil. Then, after getting down, or as he lay down, the feet were raised from the ground and placed on the tail.—*W. J. Beal.*

SERTULARIA.—In Mr. Taylor's account and plate of the Sertularia, in page 180, he has not represented the capsule with a lid. In some I have, the capsules show a lid partly opened like a box with a lid on hinges. I should be glad to know if the capsules have any of them lids which really open, or whether the appearance of them is merely caused by the membrane of the capsule bending up when the ova issue forth.—*E. T. Scott.*

FLOWERS OF LABURNUM.—With regard to the question of "L. A. B." about the flowers of the Laburnum, I cannot tell him anything; but this year I had a heartsease with yellow and purple flowers on the same plant. I think the difference in flowers from their regular colour must be caused by something they imbibe when growing, just as nearly all my purple crocuses changed to yellow this year.—*E. T. Scott.*

ARGYNNIS NIOBE.—There are at least two authentic records of the occurrence of this butterfly in England; one may be found in the "Natural History of British Butterflies," by Edward Newman, F.L.S., page 30. It was taken by Mr. Gerrard, of Lyndhurst, and is or was in the collection of the Rev. Windsor Hambrough; and Mr. Gregson tells me that he once captured a specimen in the North. —*J. Anderson, jun., Alresford, Hants.*

USES OF TAILS IN ANIMALS.—The interesting article on "The Uses of Tails in Animals," in the June number of SCIENCE-GOSSIP, ends with a confession of ignorance as to the uses of the tails of rats and mice. I would suggest that their tails are often useful as a balancing-pole when running along a narrow piece of wood, and to steady them by curling round if it be thin enough. They also press against walls with their tails when ascending, and they thus serve as a support while they get a fresh foothold.—*A. C. H.*

THE USES OF TAILS IN ANIMALS.—We entomologists would be much obliged to any one who could give us a hint as to the uses of the tails found amongst insects—caterpillars of several species especially. I have long felt that the notion of the old entomologists with regard to the appendages of the "puss" and "kitten" caterpillars of the genus *Dicranura*,—namely, that they were designed to drive or whip off the ichneumons, is scarcely tenable, when the habits of the larvæ are examined. Even this explanation would not serve to account for tails that are not pliant, such as the rigid spike at the extremity of the little caterpillar of the Chinese character (*Cilix spinula*). Then how puzzling are the horns situate just above the anus in numerous species of the Hawk-moth tribe, though these are scarcely to be called "tails." Perhaps there is something plausible in the assertion of some natural philosophers, that objects of the kind referred to may be designed merely for ornamentation.—*J. R. S. C.*

BOTANICAL EXPERIMENTS.—Having read in the May Number of SCIENCE GOSSIP, Agnes Lury's account of the growth of an acorn placed in water, and in the June Number of the same magazine a description of a similar experiment made by I. G. Halliday with a horse-chestnut, and having been most successful in rearing an oak in water, I think it may interest some of the readers of SCIENCE-GOSSIP to know exactly the different stages of my experiment, and its result. On the 1st November, 1870, I picked up a large dry-looking acorn; the same evening I half filled a transparent hyacinth glass with water, cut a circular piece of cardboard to fit into the lip, or ledge of the glass, pierced a hole in the middle, and drew through it a piece of string, tying one end round a small piece of stick, and drawing it close to the cardboard; with the other end of the string I suspended the acorn, allowing it just to touch the water; it was kept in a warm room through the winter, and in April 1871 it showed signs of life, sending down its root and upwards its stem, for which I prepared a way through the cardboard; in May it had seven leaves, which remained beautifully green throughout the summer, and then assumed the autumnal tints, falling off in October. As the water in the glass evaporated it was replenished, and in April, 1872, the young oak again put forth its spring foliage, this time bearing nine leaves, which in the autumn faded and dropped. In May, 1873, the little tree sent out its first *branch*, and bore in all fourteen leaves. In September, 1873, I very carefully transplanted the oak from the water into a large flower-pot, filled with fine good soil, and put it in my garden in Norwich, where it now flourishes (June, 1875) a small, but healthy tree, eleven inches high, with four branches. It is protected from hurt by a balloon-shaped galvanized wire cage; but since it was put abroad has had no protection from frost. For two years and ten months it grew in water, without even the aid of a dead leaf, or dust of soil to nourish it.—*Anna E. Butcher.*

TO CLEAN CORALS.—Many readers will be indebted to A. J. R. Sclater for his receipts, but if he includes *Echini* in the "dead shells which can be made to look very nice served in the same way," let your readers be careful in not subjecting *them* even to an application of *warm water:* the warm water at once dissolves the animal matter which holds the plates together, your beautiful specimen will drop to pieces, and only leave you to admire the wonderful nicety with which the plates fit into each other, &c. —*W. Budden, Ipswich.*

ANODONTA CYGNEA.—The largest specimen which I have been able to obtain from Mr. Beckwith's mill-pond at Holbrook, near Ipswich, where they are very abundant, only measures 7 inches. As Mr. Sclater has obtained specimens 8¼ and 9 inches from the river Dart, a warmer climate seems best suited to their constitution.—*W. Budden, Ipswich.*

NATURAL HISTORY IN NOVELS.—In Wood's "Natural History,—Birds, Canary," p. 472, he says,—"A feather waved over the eyes of a canary while it is lying on its back has the effect of depriving it of all power, so that it will be quite motionless until taken up." It is "in accordance with my observation" and experience, that if you place a cock on a table or floor, placing its legs underneath the body of the bird, put his beak to the board, and draw a chalk line from the beak straight along, the bird will continue for a considerable time perfectly motionless, as if tied or dead. They are apparently subject to a kind of mesmeric influence. —*W. Budden, Ipswich.*

THE STOAT.—While we are waging a war of extermination against the stoat (*Mustela Erminea*), it seems that our colonists are desirous of importing them. An advertisement appears in one of our local papers offering 5s. each for two hundred stoats, and I believe they are wanted for New Zealand. It seems to me that such an advertisement speaks very strongly in favour of our little four-footed friend.—*W. Macmillan.*

Natural History in Novels.—In answer to your correspondent "R. S. T., Surrey":—A year ago an old woman (Scotch) told me if I took a fowl and drew from its bill a chalk line it would lie quite still. I tried this with a barn-door fowl, and it answered, the fowl never moving till I took it up. I also took a young sparrow and it was rendered to all appearance quite insensible; when I returned to it some few minutes after, it had never moved and was dead.—*Fred. Casson.*

Natural History in Novels.—In reply to your "R. S. T.":—Many years ago, "in the apple-water country on the banks" not "of the Wye" but of its tributary the Lugg, a friend showed me the experiment mentioned in the "Katerfelto." Mesmerism was much in vogue in those days, and he called it mesmerizing the fowls. We drew the chalk line straight away from the bird's bill as its head was placed on the floor, when, for a short time it appeared to be paralyzed, but afterwards got up, shook itself, and crowed as if just awake. There was evidently some influence produced upon the brain through the medium of the optic nerve; the bird was dazed by the white line, which, as far as appearances went, drew out its senses by a kind of magnetic influence.—*W. Southall.*

Cats and Water, &c.—May I call your attention to a little book called "The Highland Glen," written by Miss Wrench some fifty years ago? It describes the way in which a poor family was saved from starvation by the fishing propensities of a cat: every word of it is true, and vouched for by many who were witnesses of the whole or some part of the incident. In answer to another correspondent, I may perhaps mention that it is a common habit of the old women in parts of Herefordshire, where vipers abound, to keep a bottle of the fat stripped from the back of the reptile, ready for application in case of a bite.—*J. A. P.*

The Uses of Tails in Animals.—May I suggest that it may not be improbable that the principal uses of tails in rats and mice, are to afford means by which to feed themselves when placed in circumstances when, without such a member, they would be unable to accomplish the object of their desire; *e.g.*, the case of milk or other liquids being out of the reach of either their nose or paws, they will invariably try to dip their tails in, and then put it to their mouth. Another use I believe is to afford means of climbing under some circumstances, by suspending themselves one from the tail of another. I should be very pleased to hear anything from the readers of Science-Gossip as to the habits (varying from those of the ordinary kind) and true origin of the "Manx cat," which has no tail at all.—*H. J. Marsden.*

A Voracious Eel.—Amongst others caught in a net was an eel that looked very corpulent: though only weighing 2¼ lb., it contained a full-sized water-rat, three gudgeons, and the remains of three or four minnows.—*W. Herridge, Wincanton.*

Dogs and Pictures.—The other evening my notice was attracted to our dog, which is a splendid Pomeranian. We were all quite still when suddenly his eye caught sight of a portrait of an old gentleman (almost life-size) which had lately been suspended in our dining-room. He immediately commenced barking and growling, and was not quieted until the picture was taken down and shown him.—*J. R. D.*

Mutilated Fish.—A few summers ago, I was angling in the river Cale for roach and dace, grass-hoppers being used for bait. I had caught several fish and on getting another "bite," the gut broke when I endeavoured to land something large. Putting on a fresh hook, I resumed my sport, when I found that six or seven of the fish afterwards caught, had more or less of their tails recently bitten off, as they were in a bleeding state when taken from the water. Pike frequent the river a mile or two farther down, and I suspect that it was a stray one maddened with the pain of my hook that attacked his piscatorial brethren.—*W. Herridge, Wincanton.*

Botanical Experiments.—About twelve years ago I tried a similar experiment to "Agnes Lury": the bottle was filled two-thirds with water, the acorn being suspended from a thin layer of cork, carefully fastened and gummed so as to be as air-tight as possible. Though kept in the conservatory, its germination and growth was somewhat slow; however it grew too large for the bottle, and, as the acorn was apparently useless, I placed a piece of cardboard over the mouth of the bottle, making a hole large enough to admit the stem, and suspended the root in the water, leaving the acorn outside; it throve well after being exposed to the air, which I attributed to the genial temperature of the conservatory. Unfortunately it was broken, and I lost the opportunity of observing the further results of an interesting experiment.—*Thomas C. Oborn, Tangley Park, Guildford.*

Cats and Music.—I have a cat that has apparently great fondness for music. Whenever any of the family or a stranger commences playing on the piano, and if the tune is at all lively, she fondles and purrs and evinces the greatest pleasure imaginable, and sometimes becomes so excited that she will jump on to the keys and rub herself against the hands of the person playing.—*Thomas C. Oborn, Tangley Park, Guildford.*

Spawn of Frogs and Toads.—Can any of your correspondents kindly tell me the difference between the spawn of frogs and that of toads? For several years I have reared tadpoles from spawn found in the roadside watercourses, but frogs have always been the result. Some years ago I saw some spawn in a rather deep pond unlike that which I have since kept, the eggs being arranged in single strings like beads. Was this toad's spawn?—*G. M. Doe.*

Disease in Elm-trees.—"W. A." will probably find that some change has taken place in the water-line of the subsoil in which the elm-trees stand. The most frequent cause of the death of rows of elms is that a sewer or drain has been laid along the road, or a stream has been diverted, by means of which they have been deprived of their usual quantity of moisture. The event frequently happens when estates are turned from agricultural to building purposes. Sewers are put in which drain the subsoil; the spongioles of the roots are deprived of their accustomed excess of moisture; dryness follows; they cannot get on; they cast their leaves, and the upper branches die. If there is water near, the roots may manage to find it, and the whole tree is not lost: by the time spring comes round again the tree gets enough to support life, but its beauty is destroyed. Whole rows of trees are frequently lost from this cause in the neighbourhood of growing towns. I do not know the banks of the Taw, but if "W. A." will inquire, he will most likely find something connected with the fall of the water-line in the district in question which will account for the death of the trees.—*Alfred Carpenter, M.D., Croydon.*

Coccinella.—Perhaps Mr. Anderson would be interested to know that the perfect insect Coccinella is as voracious as the larvæ, and feeds upon and destroys great numbers of aphides.—*H. Gould, Hadley.*

The Rookeries of Old London.—Of late years the word "rookery" has come to be used in a double sense, so that it is necessary to state that I am alluding to rookeries having as their occupants individuals clothed in feathers, belonging to the class *Aves*. I do not know that sufficient importance has been attached to the fact that the rook is fond of human society, which might claim for it a little more pity than it gets from farmers; and that it has shown this by its demeanour in London and its suburbs, bravely maintaining its position in spite of noise, and being subject to actual bad usage. No longer, however, do rooks visit the traditional nest in Wood-street, Cheapside; and it would be curious to know for how long a time a solitary pair and their descendants did frequent this, because it is opposed to the usual habit of the species to associate in colonies. I have even heard it conjectured that the later tenants of this nest were crows. Can any one authenticate this? Rooks still come, I believe, to the Temple and Gray's Inn Gardens.—*J. R. S. C.*

Birds and Flowers.—Having read with interest several notes both in Science-Gossip and *Nature*, the last few months, of the ravages made by birds upon the crocuses and other early spring flowers, and having carefully watched the same devastations as in former years in our own garden this spring, I venture to send to your magazine the following remarks:—In flower-gardens the house-sparrow (*Pyrgita domestica*) does some little mischief, especially among the gay blossoms of early spring. Crocuses and primroses they seem to prefer; with us they take the yellow and purple crocuses, mostly leaving the white ones, though sometimes *they*, like the others, have been bitten off at the bottom of the long tube close to the sheath. Whether they do this to get to the sweet nectar, or in search of insects, or for mischief, it is difficult to decide. It is known that the sparrow will often pick off the blossoms of the cherry, apparently (by those who have watched them) for mere amusement; therefore it is more than probable that the same mischievous birds may have snipped off the flowers of the common blackthorn, as suggested by R. A. Pryor in *Nature*, vol. xii. page 26, May, 1875. We have again also experienced great ravages amongst our primrose roots, which grow in great abundance in our plantations and orchard, while the polyanthuses, auriculas, and cowslips remain untouched. During the first week in April, most days, a handful of the scattered blossoms were brought in for me to see. Some were snipped off at the top of the stalk, just as if scissors had cut them off; others again had the corolla pulled away, leaving the calyx with the pistil remaining on the stalk, while in several instances part of the petals had been eaten away. We are inclined to think the chaffinches and blackbirds destroy mostly the primroses, as from the window I watched one of the latter birds, a fine large fellow, walk slowly round one of the beds bordered with this lovely plant, deliberately picking off here and there the *flowers*. There can be little doubt the sweetness of the primrose tempts the birds in early spring to commit these ravages, and, *may be*, they find insects too, though we may not. One fact I have each year noticed,—that when there is plenty of other food the birds like better, they leave our favourites alone.—*E. Edwards.*

Anecdote of a Sheep.—Among the many anecdotes illustrating the instinct and intelligence of the lower animals, we seldom meet with annals of the *sheep*. That little beast, with its mild, not to say stupid, physiognomy, is held to be a type of patience and gentleness, but it is not often credited with much sagacity or affection. The following incident may perhaps help to raise the "woolly people" in our estimation in these respects. During the dry months of the summer of 1874, the pastures became very short of keep. It was pitiable to see the flocks wandering from end to end of the dry sand-coloured fields, nibbling the scanty supply of hay-like grass. Our garden and lawns are separated by iron railings from a meadow, occupied during this dry time by a flock of sheep, and we were often in the habit of throwing over any green shoots or clippings for their benefit. On the occasion I refer to we had collected a goodly heap of green branches, which were soon surrounded by an eager group. They were all at work browsing on the leaves, when our attention was attracted by the excited manner and loud baa-ing of one sheep. Instead of enjoying himself, he was anxiously gazing towards an adjoining meadow occupied by a part of the flock, separated by iron railings, but from which access was possible by skirting a pond. The sheep's cry was a loud call to his equally needy neighbours to come and share the feast. It was soon responded to from the far field, but the distant flock failed to comprehend the case. In a minute or two off trotted the calling sheep, scampered at full speed across the field, still loudly crying, nor did he cease his efforts till he had guided them round the pond to the only place of exit; and then he returned triumphantly, with a train of followers, in time happily to find a tolerable meal still remaining. Could unselfishness and kindness meet a better illustration?—*J. E. A. B.*

A Curious Pear-tree.—I have a pear-tree called the "Martyr Pear." It is of great size and aged; the ground it occupies once formed a part of an inclosed garden to an ancient monastic building, which was probably erected in the fifteenth century and occupied by the monks of that period. This tree, however, must have been planted at a much later date, when the land adjacent formed a part of Windsor Great Forest. The fruit is four inches long and about two and a half inches in diameter, rough-coated, with a tinge of green and pink, dark red inside and fine flavour. When fairly divided down the centre, the pips may be seen to bleed, and have the appearance of a "martyr," from whence it derives its name.—*Thomas C. Oborn, Tangley Park, Guildford.*

Bombyx Neustria.—On June 14th a larva of *Bombyx Neustria* changed into a pupa, and next day eleven brownish oval chrysalides came out of it.

On July 18th some of these came out, and the perfect insect proved to be, rather to my astonishment, a blue-bottle. Is it usual for these flies to copy the Ichneumons? These came out of no other larvæ and pupæ than those of *B. Neustria*, and several from the same nest have also expelled the pupæ of the Blue-bottle.—*H. Morton.*

The Banded Beauty.—I should feel much obliged to any contributor of Science-Gossip who would give me some information concerning this moth, *Nyssia zonaria.* I have lived for some time in the peninsula of Wirral, but have not yet met with the insect. Newman gives three localities, one of which (New Brighton) is well enough known, but I never heard of the other two. Perhaps some one with a knowledge of the locality could inform me whether it is confined to the Wallarea corner of the peninsula, or whether it is to be met with along the coast as far as Hoylake, or up the Dee shore. I presume it is confined to the sandhills, which here form a continuous line along the shore. I should also like to know the time of its appearance, with any other useful hints as to its capture. In the event of my obtaining more than sufficient for my own cabinet, I should be happy to supply less fortunate collectors.—*W. E. S.*

Figs and Grapes in Old London.—Some astonishment has been expressed by those who have read the earlier chronicles of London, that some centuries ago fig-trees should have ripened their fruit in the City precincts, where also grew, not solitary vines, but rows of these trees, forming vineyards not only in London, but at Westminster. I do not think the right explanation of this lies in the supposition that our climate was then more genial than now: local changes will probably account for it. The soil of London has undergone a great elevation during the last 500 years; and though there were elevations here and there, much of London city, in Norman times and later, laid in a sheltered valley,—sheltered by the extensive woodlands spreading to the north, west, and east, while, southward, the Surrey hills gave a screen. There was also much marsh land contiguous; so that there are noticeable the conditions of a moist atmosphere, in which the sun had full play (for the buildings were then low), and the keen winds were shut off: hence London made some approach then to a sub-tropical clime.—*J. R. S. C.*

Poplar Hawk Caterpillars.—I should be very glad if any of your readers could tell me how it is that I have been quite unsuccessful in my attempts to rear Poplar Hawk Caterpillars? I have had them at all ages, and have given them a variety of willow and poplar leaves (including those they were found on) to feed upon; but in every case they, after a longer or shorter period, refused to eat, and died. I should be very glad to know the reason for this.—*Kate Dewing.*

Antique Remains in Swanscombe Wood, Kent.—Can any reader of Science-Gossip furnish information about these? They are situate on the edge of the wood, looking towards Southfleet. All that is now to be seen is a cavernous gap, and a round well-like opening beside it, popularly called in the locality "Clappernapper's Hole." Guide-books state that this is the site of the ancient British village of Caeber-larber, of which word the previous name is supposed to be a corruption, but I find no account of this in two or three histories of Kent I have examined. It is also said that there are (or were) a number of underground chambers; if so, access to these has been lost, possibly through the quantity of earth carried down by the rains of '69 and '70. The author of the "Jottings of Kent" speaks of these remains as "earth-mounds," so that it would seem he assumes they are tumuli, or burying-places. The soil is loam, not chalk, as is much of the land adjacent; hence we cannot suppose these are deserted chalk-quarries that have been grown over with underwood.—*J. R. S. C.*

Do Wood-lice Emit Sound?—One sunny morning recently we accidentally disturbed a nest of young wood-lice in a crack of the rugged bark of an old walnut-tree. Our attention was instantly arrested by a distinct murmur of disapproval among the members of the cosy family thus annoyed,—something resembling the faint squeaking of miniature shrew-mice—a decided sound, but unlike anything in particular, with perhaps, the exception of wind coming in through the hinges of a door. Perhaps some of your many intelligent readers may be able to inform us whether these little creatures have really the power of emitting sound.—*F. & T. R., Gwastad.*

EXCHANGES.

Cornish plants offered:—No. 235, 236, 238, 239, 245, 304, 315, 591, 835, 838, 887, 901, 1001, 1004, 1031, 1114, 1244, 1483, 1375, 1382, 1473, 1561, 1635, Lon. Cat., 7th edition. *Juncaceæ*, *Cyperaceæ*, and *Gramineæ* preferred in exchange.—W. Curnow, Pembroke Cottage, Newlyn Cliff, Penzance.

H. alliaria, H. virgata, H. caperata, H. cantiana, H. cartusiana, H. hispida, H. arbustorum, H. rupestris, B. obscurus, P. secale, C. laminata. Desiderata: Lepidoptera and Shells.—W. K. Mann, Granby House, Granby Hill, Clifton, Bristol.

Liberal exchange of first-class Slides, for a pure gathering of *Volvox globator*, or of other Desmids. Male Glow-worms, and small English Carp-fish.—E. Wheeler, 48, Tollington-road, Holloway, N.

BOOKS, &c. RECEIVED.

"Our Summer Migrants." By J. E. Harting, F.L.S. London: Van Voorst.

"Rambles in Search of Shells." By J. E. Harting, F.L.S. London: Van Voorst.

"Report of the United States Geological Survey of the Territories." Vol. VI. Cretaceous Flora. By Lesquereux.

"Report of the Geological Survey of Missouri." By G. C. Broadhead.

"Protection of Life and Property from Lightning." By W. McGregor. Bedford: Robinson.

"Country Gentleman's Reference Catalogue of Natural History, &c., Works." London: R. Horne, Edgeware-road.

"Guide to the Geology of London and the Neighbourhood." By W. Whitaker, F.G.S. London: E. Stanford.

"Ben Brierley's Journal." August.

"Land and Water." August.

"The Colonies." August.

"Monthly Microscopical Journal." August.

"American Naturalist." July.

"Canadian Entomologist." July.

Communications Received up to 10th ult. from:—E. H.—W. E. H.—A. H.—H. M.—J. U.—J. R. S. C.—A. J. R. S.—W. E. S.—J. C. W.—H M.—F. K.—F. T. R.—G. H. K.—E. E.—Dr. A. C.—R. D.—W. K. M.—D. J. P.—B. M. W.—Dr. H. W. J. E.—W. E.—C. P.—J. R.—W. H. B—F. H. A.—H. E. W.—T. C. O.—W. G.—W. L.—W. T.—G. M. D.—H. H.—E. W.—H. W.—H. P. M.—J. E. N. B.—C. P. G.—B. D. J.—H. B. T.—W. E.—W. L. W. E.—G. S. F. N.—G. P.—A. B.—T. B. W.—W. J. F.—M. B. D.—J. F. R.—J. P. H. B—E. E.—G. P.—W. A. C.—F. B.—W. J. H.—H. E. W.—T. D. R.—E. I.—E. T. S.—J. E. D.—H. W.—H. G. G.—S. A. K.—F. H. A.—W. J. M.—W. E.—W. C.—J. R.—H. E. W.—H. G W. A.—E. D. B.—J. W. B.—J. W. P.—C. W. T.—R. L.—F. H. A.—E. T.—H. P.—C. J. C.—M. C. C.—H. F. P.—R. K.—W. L. W. E.—W. L. M.—J. S. B.—C. R.—C. D.—J. A., jun.—J. E. D.—E. T. S.—J. F. R.—J. B. B.—W. J. B.—F. R. M.—S. A. K., &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

J. S. Bolton.—We should undoubtedly regard a plant grown under the circumstances you name as still a *wild* plant. It would require more than one generation to make it otherwise.

C. J. C. (Croydon).—The "fungus-looking matter" in the bottle is probably an imperfect alga, not uncommon in various fluids. Such things cannot be determined from mere description.—M. C. C.

W. H. Beeby.—Your specimen on *Adoxa* is *Puccinia saxifragarum*, Sch. See Cooke's Handbook, No. 1506.—M. C. C.

J. A.—Your specimens are as follows:—1, *Æcidium compositarum*, Cooke's Handbook, No. 1624; 2, *Æcidium violæ*, Cooke's Handbook, No. 1626; 3, *Lecythea potentillarum*, Cooke's Handbook, No. 1460; 4, probably *Oidium*. Specimens all too small, especially this, for an accurate determination. Cooke's "Microscopic Fungi," with coloured figures, price 6s., published by Hardwicke, 192, Piccadilly.—M.C.C.

T. Boger (Wolsdon).—No book on insects would be likely to contain a notice of the ticks inclosed, as they do not belong to the *Insecta*, but to the *Arachnida* (section *Acaridea*). They are male and female of *Dermacentor pardalinus*, C. Koch, in the family *Ixodides*, of which that author states the original locality to be "probably Hungary." They could only be found in or about *Pinus insignis* (wherever that tree may have come from), or any other tree, for the sake of shelter, as they and their allies are suckers of animal juices. They undergo no "transformation," properly so called, merely obtaining a slight progressive development by successive moultings of skin. It is impossible to name the other tick mentioned without seeing it.

Jno. Webb (Stoke Newington).—The flour-beetles sent are *Tribolium confusum*, Duval; until recently confounded with the commoner *T. ferrugineum*, Fab., from which they may be known by the club of their antennæ not being abrupt. These two species, with *Alphitophagus quadripustulatus*, Steph., *Gnathocerus cornutus*, Fab., *Hypophlœus depressus*, Fab., *Alphilobius diaperinus*, Panz., *A. piceus*, Oliv., and the two much larger "meal-worms," *Tenebrio obscurus*, Fab., and *T. molitor*, Linn., are well-known inhabitants of bakeries in this country—into which probably all have been introduced by commerce, many of them now being found in most parts of the world. They are all members of the great Heteromerous section of beetles.

T. Cooke (Stalybridge).—The beetles inclosed are *Aphodius fimetarius*, Linn., very abundant in animal droppings all over the kingdom. The best introductory work on British Coleoptera is Rye's "British Beetles," published by Lovell Reeve & Co., Henrietta-street, Covent Garden, London, price 10s. 6d.

C. F. G.—No. 1 is *Ammophila viatica*, Lin., female; 2 is *Pompilus sepicola*, Fabr., male,—these two are sand wasps; No. 3 is a bee *Specodes subquadratus*, Wesm. Please in future pin insects you want naming.

E. W.—Apply to Edward Newman, 9, Devonshire-street, Bishopsgate, London.

W. K. M.—For beginners, the cheap series of Genera published by L. Reeve at 10s. 6d. each, are the best, giving coloured figures and descriptions of each genus,—bees by Shuckhard, beetles by Rye, spiders by Staveley. Do not know of any other cheap book on spiders. Stephen's Manual of British Coleoptera may be had at second-hand book shops for about 6s.; is as good as any, but this has no plates. And for the aculeate hymenoptera, first-rate ones are published by the trustees of the British Museum in two parts; the first is called "Smith's Catalogue of British Foss. (Bees);" the other, "Smith's Catalogue of British Hymenoptera (Bees)," complete, price 5s. each.

J. D. H. (Gloucester).—The best paper is white cartridge, which may be procured from any stationer, size about 17 in. by 10 in. The best paper for drying specimens is Bentall's, which can be obtained only from Mr. Newman, Devonshire-street, London.

J. C. (Berwick-on-Tweed).—The little plant is Butterwort (*Pinguicula vulgaris*), not uncommon, though seldom noticed by ordinary observers, in boggy places. Your fern is the *Polystichum uculeatum*.

H. F. E. W.—The specimen you sent to us is most nearly allied to *Conferva spiralis*, although it scarcely answers to our book descriptions.

Naiads.—We submitted your specimen to one of our leading botanists, who stated: "I am not certain about the *Ruppia*; it seems to have the inflated sheath of *spiralis*, and the straight peduncles and more slender habit of *rostellata*." *Zostera* was missing from your note.

H. W. (Embsay).—The elegant little fern you found near Malham is the Brittle Bladder-fern, *Cystopteris fragilis*.

W. T. B. (Swansea).—The withered leaf sent is not a fern leaf, or frond, but probably belongs to some composite plant.

A. S. J. (Holborn Hill).—The fern fronds you inclosed are as follows: A, *Polystichum angulare*; the large frond, B, is our common though elegant Lady-fern, "*Athyrium Filix-fœmina*."

B. M. W. (Treaddow, Ross).—The barley spike is not attacked by any parasitic fungi, but in seasons where heavy rain falls about the time when it is in flower (*i. e.* stamens are visible) many of the stigmata remain unfertilized. We cannot account for the fact, we simply state our experience; probably your barley may be partly infertile.

J. C.—1, *Hypnum myosuroides*; 2, *Pogonatum aloides*; 3, *Catharinea undulata*; 4, *Plagiothecium sylvaticum*; 5, *Bryum elongatum*; 6, *Funaria hygrometrica*.

G. Parsons.—All are right except No. 5, which is a small state of *Hyp. confertum*.

M. Pearson.—The plant sent is *Andreæa alpina*, and is certainly nerveless.

R. R. F.—1, *Pottia truncatula*; 2, *Fissidens taxifolius*; 3, *F. viridulus*; 4, *Hypnum populeum*.

M. Warren.—1, *Hypnum ochraceum*; 2, *Bryum intermedium*; 3, *B. pseudotriquetrum*; 4, *Hypnum palustre*; 5, *Weissia verticillata*; 6, *Dicranella varia*; 7, *Tortula tortuosa*; 8, *Hypnum plumosum*; 9, *H. rutabulum*.

W. H.—1, *Mnium hornum*; 2, *Hypnum triquetrum*.

G. P.—The truffles sent are *Tuber albus*, and as a proof they are edible, we may state that we have eaten the specimens sent, or rather used them for flavouring, a small quantity at a time. The best plan is to hang them in a dry current of air till they are perfectly dry, and will crumble into powder, so as to be readily used for flavouring.

EXCHANGES.

Wanted, to correspond with, readers of Science-Gossip, on the subject of Exchange of Natural History specimens.—Edward T. Nelson, Delaware, Ohio, U.S.A.

I have a few Shells and Minerals, and will exchange them for other Shells.—Address, G. T. F. Napier, Alderley Edge, Cheshire.

Eggs of Sedge Warbler, Butcher-bird, Jay, Sand Martin, Nightingale, Blackcap, Skylark, Herring Gull, and others, for other good Eggs.—H. George, 19, Chenie-street, Bedford-square, London, W.C.

Wanted, *Hyoscyamus niger*, fresh specimens; will send gutta-percha tissue and stamps, to protect it, and good exchange.—H. Higginson, New Ferry, Cheshire.

For Spines of Hedgehog send other interesting Micro. Objects. Well mounted Slides for others, or for Books on Natural History.—W. Tylar, 165, Well-street, Birmingham.

Wanted, mounted or unmounted specimens of British Starfish, for Slides or Micro. Material, Marine or Land and Freshwater Mollusca, &c.—F. R. Martin, Shaldon, South Devon.

Well mounted Slides of various Diatoms, for others, or Material: must be good.—H. B. Thomas, Boston, Lincolnshire.

Eggs of Sandwich Tern, Cormorant, Little Grebe, Quail, and Snipe, for Eggs of the Tawny and Short-eared Owls.—Address, C. Dixon, 60, Albert road, Heeley, near Sheffield.

Diatoms, well mounted, for Diatom Slides, or any other objects of interest, or Diatomaceous Material. Lists exchanged.—R. K., 24, Victoria-place, Stirling.

The "Preparation and Mounting of Microscopic Objects," by Davies, new, for "Half-Hours with the Microscope," with the chapter on the Polariscope.—Joseph Anderson, jun., Alresford, Hants.

Any three of the following (good dried specimens) for living specimens of *Arthrolobium ebracteatum*, *Arabis hirsuta*, *Trifolium strictum*, *T. Bocconi*, *Lathyrus hirsutus*, *Sibthorpia europæa*, *Juncus capitatus*, *J. pygmæus*, *J. compressus* (true), *Scirpus parvulus*, *Cyperus fuscus*, *Carex depauperata*.—W. H. Beeby, 2, Outram Villas, Addiscombe, Croydon.

Eriocaulon septangulare, for rare Plants.—G. C. Druce, Northampton.

Duplicates, Pupæ of *P. Machaon* (Swallow-tail butterfly), and Imagos of *A. Adippe*, *A. Silene*, *T. quercus*, *P. Ægon*, and *F. piniaria*. Desiderata: *M. fuciformis*, *G. C. album*, *T. betulæ*, *E. blandina*, *A. cratægi*, Pupæ of *A. atropos*, or offers.—D. J. Preston, Riversfield, Catton, near Norwich.

Carex ornithopoda, for rare British Plants.—W. J. Hannan, 6, Tatton-street, Ashton-under-Lyne.

A few Oblique Sections of *Pteris aquilina* for distribution, on receipt of stamped addressed envelope to E. Lovett, Holly Mount, Croydon.

A fine specimen of the new volute *V. Elliotti*, for *Harpa rosa*. Other exchanges wanted.—C. Pocklington, 4, Sydenham-hill, Cotham, Bristol.

Aglaia Euphrosyne, *Atalanta Semele*, *Artaxerxes Isus*, *S. populi*. *Velleda humuli*, *Plantaginis faliginosa*, *Quercus*, and others, for other Insects.—John Rae, 16, Hanover-street, Aberdeen.

ON SETTING AND PRESERVING HYMENOPTERA.

By JOHN B. BRIDGMAN.

HAVING been asked to give some instructions as to the method of setting and preserving the aculeate Hymenoptera, it is with great pleasure I comply, and I hope it may be the means of induciug others to collect these insects. To begin at the beginning, it is almost needless to state that the females of all of them (a few of the ants excepted) are furnished with stings, but with very little care one need never be stuug. As Mrs. Glass says, "First catch your hare": so first I shall give a few instructions where to look for and how to catch these insects. All the apparatus necessary is a gauze riug-net, a cyauide bottle, and a pocketful of small card pill-boxes; the cyauide bottle is best made by wrapping a small piece of cyanide of potassium in two or three thicknesses of blotting-paper, tying it round with cotton to prevent it shaking out, then fixing it to the bottom of a wide-mouthed flat bottle with sealing-wax, which is made to adhere firmly to the glass by heating the glass carefully over a lamp, and then corking it up. The pill-boxes ought to have the tops and bottoms fastened in with liquid glue (a preparation of shellac). These are all that are required to catch and bring home the game; which is to be looked for at the flowers of trees, bushes, and plants,—one season's experience will teach the best, as some species frequent one, some another, and some almost all. The flowers I have fouud the greatest favourites are sallows, willows, sycamore, holly, blackthorn, bramble, hawkweeds, ragwort, thistles, and umbelliferæ. Some bore in putrescent wood, aud must be looked for on or in the neighbourhood of old posts aud palings; some are to be found flyiug about dry banks, hard-trodden pathways, on heaths, while old sandpits are favourite places; but they should be sought for in auy warm, rough, weedy spot; and some may be obtained by digging them out of their burrows with a trowel. My plan of proceeding, after having got one in the net, is to catch hold of the net so that the insect is inclosed in a sort of sack, I then uucork the cyanide, and iutroduce that into the sack, holding the net firmly round the neck of the bottle, so that there is no other escape for the insect from the net but into the bottle, then gradually work the insect into the bottle and close the mouth with several folds of the net, watch my opportunity and insert the cork: when the insect is stupefied, which happens in a few seconds if the bottle is slightly warm, I turn it iuto the pill-box. A word of caution: it is necessary to be methodical in carrying the boxes; I always keep the empty ones in my right-hand pocket and the filled ones in the left-hand one, as, if they are carried sometimes one way, sometimes auother, sooner or later a previously filled one will be opened to put an insect in, which will result in the former tenant speedily makiug room for the new-comer, and my experience has been, if you do lose anything it is generally your best capture. Having got home with the left-hand pocket more or less filled, turn the boxes out, preparatory to killing the contents, which must be done with burnt sulphur. My mode of proceeding is as follows:—I stupefy the contents of each box with chloroform, in a manner I will describe further on; having stupefied them, I empty them all into a short, wide-mouthed round bottle, having a piece of glass tube put through the cork; the mouth of the tube is plugged with cotton wool, not too tight, to act as a straiuer. I then put this in a nabob pickle-bottle (any other bottle will do as well), through the stopper of which I have drilled a hole about a sixteenth of an inch in diameter, in which is fixed a copper wire, having a shallow tin cup at the end. In this tin cup is placed the sulphur. The tin cup is then held over the flame of a lamp, gas, or caudle, till the sulphur is burning, then put it into the bottle and press it down. When all the oxygen is cousumed the sulphur goes out. Leave them for about three hours, take them out, and put them into a damp box for twelve or more hours: they will then be in

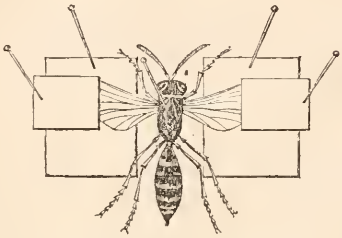


Fig. 140. Insect set with table-braces.

a splendid condition for setting. To stupefy the iusects I tip the lids on one side, put them iuto the sulphur-bottle, pour a drop or two into the tin cup, and put it into the bottle. Be careful not to chloroform them too much, as if killed so they become so rigid that it is with difficulty they can be set.

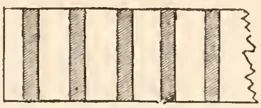


Fig. 141. Wood, with the strips glued on.

Having killed them, there only remains to pin and set them. There are various sizes of pins used; most collectors have fancies of their own on this subject; I shall therefore only say what is my practice. The pins I use are D. F. Tayler & Co.'s New Hall Works, Birmingham; No. 15 for bumble-bees only; the other sizes I find most useful are 15, 10, and 18. Some pin the insects straight, and some with the pin inclining forward. Having pinned them, the next thing is to set them. There are two ways of doiug this; one is, cut an oblong square of stout cardboard and put a pin through one end; after the legs are stretched out, this is put into the cork, one on each side, till the upper surface of cork is just below the level of the wings, which are then laid out on the card, and held there by a brace the same shape as the table (see fig. 140). If the insect has beeu properly killed, the legs and antennæ will keep set out without the aid of pins; if not, this is doue with bent or straight pins as may be necessary. The other way is a "hymn of my own composing."

First take one of the strips of cork as sold at the shops, paper it on both sides with thin soft paper; then take a piece of wood a little larger than the cork, about half an inch thick; on this I glue strips of cardboard, or thin wood, according to the size of the insect, side by side, and as far apart as necessary (see fig. 141). These being dry, I glue the sheet of cork on to the top of the strips, which leaves it

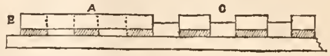


Fig. 142. Ditto, side-view. A, the same with the cork glued on; B, cork; C, the same with the cork cut through at the dotted lines in A, and fastened down.

looking like a succession of bridges. When this is dry the cork must be cut through betweeu the pieces first fastened on the wood; these pieces are then taken out and glued to the wood (see fig. 142); this leaves many setting-boards, something similar to the single rounded ones used by lepidopterists; but these are flat,—they want to be just deep enough for the insect aud wide enough to allow the legs to be stretched out. A little practice will soon determine the size. The wing I hold down with small triangular braces. Each board will hold about seveuty or eighty insects; beneath I put the date they were set, and leave them on the board about a month to dry, as if taken off too soon the wings spring. Always put a label to each specimen, either with the date or a number corresponding to one in a book, in which enter the date aud locality.

One more observation and I have done. Sometimes one comes across au insect whose rigid wings seem to defy all attempts to set; in such cases just press firmly at the back part of the thorax, between that and the abdomen, towards the pin, and the wings will sometimes fly open of their own accord, or will allow of their being easily set in the required directiou, which should always be set well forward.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XII.—Spinach (*Spinacia*).

THIS vegetable, which belongs to the same family as the Beet (*Chenopodiaceæ*), appears to have been unknown to the ancients, unless, as some authors think, it might be the Chrysolacauou of Dioscorides or the Blitum of the Romans; but the properties described as belonging to these plants make it very uncertain what species is really intended, as several of this order of plants have been and are still used for cooking and salads. Spain is supposed to be the first European country into which Spinach was iutroduced. Miller, iu his "Gardeners' Dictionary," says, "Perhaps the

Spaniards had this plant from the Saracens; but by some it is considered to be indigenous to Spain, as many of the old botanists—such, for example, as Bock—call it *Olus Hispanicum*. Ruellius and others name it *Atriplex Hispaniensis*."

According to Beckman, the first notice of its being used as an edible substance in Europe occurs in 1351, in a list of vegetables used by the monks on fast days, and at that time it was called Spinargum or Spinachum. Rather more than two centuries later it seems to have been in cultivation in England, as Turner, in his Herbal, which was published in 1568, mentions it as "a herb lately found, and not long in use." Gerard observes,—"This herb of all pot-herbs maketh the greatest diversities of meats and salads." The young leaves of Spinach were used in salads in the time of Elizabeth down to the reign of Charles I.

Parkinson, who wrote on plants in the reign of the last-mentioned monarch, writes thus on this plant:—"Spinach is an herb for sallet and for divers other purposes for the table only, for it is not known to be used physically at all. Many English, that have learned it of the Dutch people, do stew it in a pot or pipkin without any moisture than its own. It is used likewise to be made into tarts and many other varieties of dishes, as gentlewomen and their cooks can better tell than myself." Spinach is still considered as a pot-herb of considerable importance, being in demand for the kitchen at all seasons of the year, but more particularly in the spring. Phillips (in his "History of Cultivated Vegetables") says: "The juice of spinage being nearly tasteless, and quite inoffensive, is the only green colouring that cooks and confectioners should be allowed to use in their ornamental eatables." Spinach contains a considerable amount of nitre; and it is said that paper soaked in the water in which it has been boiled makes as good touch-paper for fireworks as that made by a solution of nitre. Boerhaave states that the fresh herb affords a thick, but very wholesome juice, which mitigates the asperity of the lungs, and is of service in inflammation of the stomach. Phillips relates an anecdote of Fontenella, who was a great epicure, and excessively fond of this vegetable. An acquaintance, who was equally fond of spinach, appointed to dine with him, at a season of the year when but a small portion of their favourite vegetable could be procured. Just as the dinner was to be dished up, the cook inquired if his master would have the spinach served up *au gras*, which was his favourite way, or *au maigre*, as his friend preferred it, or if it should be divided and sent up both ways. Fontenella desired the cook to wait until the guest arrived before he dished it up. At that moment a messenger entered to announce the sudden death of his expected friend. Fontenella, having received the message, called out to the cook, "Send up all the spinage *au gras*,"—showing that he thought more of his appetite than of his departed friend.

There is a wayside plant which was and is still used, I believe, in some parts of the country as spinach (*Chenopodium Bonus Henricus*), called by various names, such as Good King Henry, Lamb's Quarters, Fat Hen, &c. In Lincolnshire it was cultivated and preferred to the garden spinach. Galen, one of the most celebrated and valuable of ancient writers on medicine, born A.D. 131, recommends, so it is said, the leaves of this plant for poultices, to assuage swellings and inflammations. Matholi, a writer in the sixteenth century, says that the seeds boiled with wormwood, and drunk, cure the jaundice in a very speedy manner. Culpepper says that the juice of this plant rubbed upon warts takes them away. The young shoots of this plant used to be peeled, and eaten as asparagus. The seeds are used in the present day with others, in the manufacture of shagreen. Miller, in his Dictionary, thinks that this plant was not indigenous to our soil, but an escape from cultivation. The etymology of the name "Good Henry" is uncertain; still the name is prevalent over a great part of Europe. The Germans call it Guter Heinrich, while in France it is known as "Bon Henri." How the word king got added to it in England was, perhaps, that this plant was first brought into cultivation or introduced in the reign of Henry VI., who was styled the "good," and as he founded Eton College he was doubtless a favourite with the monks, from whom many of our plants received their names.

The generic name Spinacia is derived from *spina*, "a prickle," from the prickly integument of the fruit or seed in some varieties.

Some years since a plant belonging to the nat. ord. *Tetragoniaceæ*, was much cultivated under the name of New Zealand Spinach (*Tetragonia expansia*). This plant was discovered by Sir Joseph Banks in 1770, at Queen Charlotte's Sound, New Zealand, when with Captain Cook in his first voyage round the world. Specimens and seeds were brought to England, and its introduction by Sir J. Banks to Kew Gardens is recorded to have taken place in 1772; but the value of the plant as an edible vegetable was discovered in Captain Cook's second voyage, when Foster, who went with that expedition in 1773, found it in great abundance in the same locality mentioned by Sir J. Banks, and during the stay of the ships at that place the sailors were daily supplied with it at their meals. It was also found on the shores of Tonga-taboo, one of the Friendly Islands. The inhabitants of these countries did not appear to eat it, or know its good qualities. Thunberg found it growing wild in Japan, where it is called Tsura Na, or creeping cabbage. The Count D'Ourches, who had obtained seeds of it from the "Jardin du Roi," at Paris, first published an account of it as an esculent. It was at first treated as a greenhouse plant, but now grows freely in the open garden, and, indeed, seems to have naturalized itself in the south-west of England. A writer from Exmouth observes in the "Gardeners' Magazine," 1829: "The New Zealand Spinach is quite a weed with us, as wherever it has once grown plants rise spontaneously."

This spinach has an advantage over the common sort under cultivation in producing an abundance of large and succulent leaves during the hot weather, when the latter plant runs almost immediately to seed, and produces little or nothing. It is likewise milder in flavour, and of so rapid a growth that a bed of about twenty plants is sufficient for the daily supply of a large family; but perhaps the chief objection to it as a cooked vegetable is the abundance of mucilage, which gives it somewhat a slimy consistency. Still, in the hands of a skilful cook, it may be made an excellent dish.

New Zealand spinach is remarkable as being almost the only native of the isles of Australasia which has been worthy of a place in the kitchen gardens of Europe.

An interesting account of this plant will be found in the Hort. Soc. Trans., vol. iv. p. 488.

HAMPDEN G. GLASSPOOL.

AN AQUARIUM STUDY: THE WARTY NEWT (*Triton cristatus*).

LAST year, on the 5th of July, having received a batch of this species of newt (*T. cristatus*), consisting of three males and one female, taken from a field-pond, I put them into a vessel containing water only, and was thus enabled to determine of what their food had chiefly consisted, which was a small bivalve mollusk of the genus *Pisidium*. In most of these mollusks the valves were open, with contents extracted; four, however, were closed, and three of them contained young—one three, another two, and a third one only. Although the adult mollusks were extracted from these closed shells, the young ones, which, with one exception, had their valves closed, were not, but were distinctly visible within the semi-transparent shells.

Four days later I took a description of the newts, which is given:—Female: Head, body, legs, and tail of an earth-brown colour; margins of lips, sides of head, body, and tail-column speckled with white, as are also the legs; toes dull orange, barred with brown; sides of upper lip very distinctly lobed, the festoon overlapping under lip; throat dusky, covered closely with speckles, mostly white, a few, however, being orange; breast and belly orange, also embracing anus, and extending along under side of tail to tip; the black spots on breast and belly numerous, irregular, and many of them confluent; under side of fore legs dull orange, with brown markings, and much speckled with white; of hind legs brighter orange, with black markings, and fewer speckles; fore legs and toes slender; hind ones much stronger; tail short, stout; fins low and fleshy; along centre of back, instead of a crest, is a depression, commencing on head, and in part occupied by a low and ill-defined ridge; upper tail-fin rises gradually from loins: there are many small, obscure, roundish, dark spots on body and tail; eyes black, with golden irides, not divided as in Smooth Newt; toes four and five. Length:—From tip of nose to extremity of vent, 3⅝ inches; from vent to tail-tip, 1⅞ inch: total, 5⅝ inches, the tail proving exceptionally short.

Male (No. 1): Upper part of body to base of tail, of a warm dark brown colour (orange in it); basal half of tail blackish-brown; apical half warmer; top of head blackish-brown, mottled with lighter (orange-brown); sides of head blackish-brown, mottled with white; margin of under lip mottled with white; sides of body speckled with yellow instead of white, as is also basal portion of tail, to which the speckles are confined; fore legs dark orange-brown, mottled with black; toes dull orange, barred with black; hind legs lighter orange-brown, spotted with black; toes orange, barred with black; sides of upper lip lobed, the festoon much less than in female; throat dusky, closely speckled with orange and white; breast and belly a bright orange, embracing anus, and first quarter inch of under side of tail; the black spots on breast and belly roundish, regular, and distinct; under side of fore and hind legs and feet orange, spotted with black; both fore legs and feet (toes) and hinder ditto are considerably longer than in female; tail is also much longer and more slender; margin of upper fin serrate, of under one plain; crest commences on head between eyes, and extends to loins, is about one-eighth inch in height, serrate, and blackish in colour; the hiatus over loins is scarcely one-fourth inch long; tail-fin rises from it in a gradual slope; body and tail spotted with black.

Male (No. 2): Head blackish-brown, unrelieved by lighter mottling; margins of lips and sides of head speckled with brown and white, the brown ones or cheeks to back of eye; throat dusky, closely speckled with white; under side of fore legs speckled with white; speckles on sides of body orange and white, there being also a few white ones on basal portion of tail; tail-tip bifid, caused by a short downward ramification of vertebral column. Length, 5¾ inches, which was the length of No. 1, with which it was identical in all other points.

Male (No. 3): Darker and much smaller than the two former, but quite as perfect in seasonal development. Length, 4$\frac{1}{12}$ inches. In this specimen one of the hind feet had seven toes, there being two additional small ones between two inner ones.

Having made the Smooth Newt (*L. punctatus*) a special study, and observed that in it the lobed lip and toes, the high, scalloped, continuous crest, and upper tail-fin, with under ditto in male, and lobed lip, low and very gradually rising ridge, assuming on tail the dimensions of a goodly fin, with under fin of equal depth in female, were appendages of the breeding season, disappearing with it and the reptile's aquatic life, and seeing sufficient in the above examination to cause me to think that the development and disappearance of the lobes on the upper lip of this species would be analogous,—I this year obtained several more, and am satisfied that it is so.

The first batch of this year was obtained on May 14th, from the same pond as that of last. In males the crest was well developed, commencing between the eyes as a rapidly rising ridge, was closely serrated throughout, the serrations varying in size; distinct hiatus over loins, low ridge occupying it; sides of upper lip lobed very distinctly; lobes, however, do not extend below under side of under jaw, but embrace it, curving inwards. Females had lip lobed to some extent. In males the upper web of tail was of fair height and finely jagged throughout; under web much lower and margin plain; column of apical half of tail silvery white, the webs orange-brown; basal half of tail with webs nearly black.

On the following day another batch was obtained from a different field-pond, and the males of it had crest and fins much further developed than those of former lot, whilst the lobing of lip appeared identical. Upper parts of body, with crest and fin, a dark olive-green; whereas the same parts in the last were brown, with an obscure olive-tinged silvery streak on tail column very obscure.

Keeping two of the newts—the best developed male and a female—I again examined them on June 24th. In the male the crest had dwindled down to a low toothed ridge, the upper tail-fin or web being of fair dimensions, but margin quite plain, whilst lobes from sides of upper lip were entirely obliterated; under web of tail only one-half the depth of upper. Female had just a remnant of lobes left; as in male, under web of tail was of considerably less depth than upper.

On July 3rd the male died, having still a remnant of crest along back. For some days previously I had been unable to obtain earth-worms, which formed their principal food, and they had refused the raw lean meat offered, and made strenuous efforts to leave the water. In all probability the time had arrived at which, had they been in their native haunts, they would have left their aquatic for their terrestrial abodes, as it is at this stage that the smooth newts do so.

Very frequently the Warty Newt casts its skin, which breaks at the margins of the lips, and, after sundry gapings and noseings among the plants of the aquarium, is pushed back on to the neck, rumpled as in Smooth Newt, or, perhaps, that from under jaw hanging flap-like from throat; then the newt pushes through amongst the plants and between them and the sides of the aquarium, twisting and contorting the body in its efforts to get cuticle worked onwards, and, having succeeded in getting it down to hind-quarters, frequently turning round, seizing it with mouth, divesting itself altogether of it and gulping it, the whole operation occupying maybe an hour, sometimes much less. Probably I would be correct in saying that the skin of this species was cast away on the third day. That it was so at different periods, and in different individuals at the same time, was observed; but, owing to the fact of its being frequently cast during the night, and of its being eaten by its owner, this circumstance could not often be observed.

Given a sufficiency of room and of planted aquatic herbage, it is probable that the obsolete cuticle will rarely be found in patches or shreds attached to either this species or the Smooth Newt. Of all I have had during the last five years, none were received in that condition; and given the above conditions in my aquaria, it has very rarely occurred, and the smaller species casts its skin at least as often as the larger one. Indeed, I have seen a tadpole of the Smooth Newt about an inch and a quarter long, whose branchia, though apparently on the wane, were of a good size, which evidently had divested itself of cuticle in adult fashion. When first observed, the obsolescent cuticle was breaking at margins of lips, the tadpole frequently gaping, and could be observed loose at various parts of the body, on branchia, but more especially on the under side of head and throat. On looking again, some time later, I found the tadpole had got entirely rid of it, and was making a meal of it, the slough of two of the legs and feet being yet visible projecting from its jaws. Moreover, there is evident uneasiness at constraint of obsolescent cuticle.

As already stated, the newts were chiefly fed on earth-worms, of which they disposed in a manner similar to that of the Smooth Newts, in a series of jerking gulps. When worms failed, raw lean meat, chiefly mutton, was substituted, cut up somewhat worm-like and having motion imparted to it; this in general was pretty readily taken, but sometimes refused. To frog-tadpole they were partial enough, two newts reducing a colony in a fair-sized aquarium to less than half a dozen. Sometimes I inclosed in small aquaria a single newt and a few tadpoles, which soon disappeared. The House-fly (*M. domestica*) they also ate.

That temperature, if not food, exerts considerable influence on the seasonal development, appears pretty evident. For instance, on the 17th July, present year, a female I obtained from the same pond as those of May 14th, had the lobes on sides of upper lip, although waning, extending almost to lower margin of under jaw, whilst these same appendages were altogether obliterated from lip of principal male of this year's notes, and almost from that of females, as early as the 24th June. In the case of the Smooth Newt I have had similar evidence in a larger number of individuals, both male and female.

The male newt above mentioned, obtained in mid May, being at that time apparently at full seasonal development, and having upper parts of body with crests and fin of a dark olive-green colour, was, on the 24th June, in those same parts, of a dark brown spotted with black. The margins of lips, sides of head, body, and basal fifth of tail, with upper and under sides of legs, were all speckled plentifully with white; silvery streak on tail-column as when got,—very obscure; throat dusky, closely speckled with orange and white; orange of breast, belly, anus, and first $\frac{1}{4}$ in. of under side of tail, bright and deep. In its female companion the orange of same parts was lighter,—yellower.

In another female of which I took a particular description, the speckling was precisely similar in colour and as liberally laid on as in the last-mentioned males, but, like the female described at commencement of this paper, the tail-column throughout was as liberally speckled. The depression along centre of back from head was very marked in this specimen, and the low ridge commencing at some distance from head occupying it, and at loins gradually rising into fin, was also pretty evident.

Length:—From tip of nose to extremity of vent, $3\frac{5}{8}$ in.; from vent to tail-tip, $2\frac{5}{8}$ in.: total, $6\frac{3}{8}$ in.

One marked difference between the male and female Warty Newt is that the orange of under parts extends only along a very small portion of under side of tail in the former, whilst in the latter it extends to tail-tip, and from its brightness, especially on first two-thirds of tail, forms a striking feature during the reptile's aquatic career.

CHARLES ROBSON.

Elswick, Newcastle-upon-Tyne.

HOLIDAY RAMBLES.

No VII.—The Isles of Scilly.

"IT'S all very well to go over to Scilly for a day, but to talk of staying there for a week! Why, sir you hav'n't seen Land's End, nor Buryan Church, nor the Lizard, nor . . . . . Ah well! we shall see you back, sir, to-morrow; you'll think better of it when you get there!" Such were the last words of my host at Penzance. Very similar had been the prognostics of London friends. One said—"The living is wretched; in the small islands nothing but bread and cheese." Another's report was—"The weather is of three kinds—one all wind, the second all rain, and the third a mixture of wind and rain." Nevertheless I went, stayed my week, and left with a hearty wish that my available time had been two or three weeks instead of one.

A stranger arriving at St. Mary's will scarcely have landed, when he will find great masses of *Mesembryanthemums* growing on the walls as freely as stonecrop grows about London. In the gardens he will find the Fuchsia, the Scarlet Geranium, the *Calla*, and many other "greenhouse" plants, established as hardy out-door residents; and he will hear of more surprising things to be seen in Tresco. In his first stroll—probably to Peninnis Head—he will find that he has lighted upon an island offering him abundant matter for thought, in its vegetation, and in the strange sculpturing of its magnificent granite rocks. And if he be an admirer of scenery, he will look out with delight on the varied and beautiful groupings of the many islands in sight. But if he have had any experience of a sea-life, he will, as he looks at these same islets, comprehend the dread with which a mariner would regard an approach to Scilly during the storms and fogs of winter. He will feel that the beauty under a summer's sun is like the beauty of the sleeping tiger.

Although the visitor will find in St. Mary's abundant evidence of the mild climate into which he has come, yet he will not realize all that this island-climate has rendered possible, until he visits the gardens at Tresco Abbey,—gardens generously thrown open to visitors by the Lord Proprietor of the islands, T. A. Darrien Smith, Esq. Here, protected from the winds, which at times sweep with terrible fury over the islands, flourish semi-tropical trees and plants from nearly every hot country in the world; not as ornaments, to be taken into shelter in winter, but as hardy, robust fellows, not afraid to look Christmas in the face—in Scilly. I should fail in any attempt to enumerate all that I saw, and therefore I gladly quote from a letter written by Mr. W. F. Gardiner, who has charge of this fair domain.

"Very striking among the groups of tropical and other plants are the *Dracænas*, which grow in the open air with great vigour, some being already 20 ft. high. *Pittosporums*, or Mock-oranges, are in profuse and fragrant beauty. *Escallonias* form hedges 10 ft. high. *Pruza Chiliensis* forms an immense mass. Camphor Laurel grows from 10 to 15 ft. high. *Fourcroya longæva* grows well, and there are now (July, 1875) two specimens in blossom with stems 20 ft. high. The Aralias form masses 20 yards in circumference; while among other rarities (as open-air residents) are the Golden Acacia, Australian Pepper and Musk plants, Cinnamon Laurel, Fan and Date Palms, the Banana of Abyssinia, Dammaras, Bambusas, the *Dicksonia squarrosa*

&c. Thus it may be truly said that nearly every country of the world has one or more representatives flourishing here, and that they here flower annually, and ripen their seed. The Mesembryanthemums, Sedums, Echeverias present glorious masses of flower, or of strange un-English foliage. But to the casual visitor, perhaps the Agaves, of which there are this year (1875) 48 coming into blossom, with stems of 20 or 30 ft. high, are the most striking of all the plants."

I cannot print the entire list given to be me by Mr. Gardiner, but have probably quoted enough to show how marvellous is the grasp of the climate, if only protection from the wind be given. Then how strange is it to find that no stone-fruit (not even the Plum or Cherry) will ripen in the islands, though the trees blossom freely, and of frost there is none to cut off the bloom. And, further, no indigenous wild plant grows here with more vigour (so far as I could see or learn) than it exhibits on the mainland of England. The home-grown apples are much praised by the Scillonians, but I doubt if a Covent-garden dealer would value highly the small fruit, which hangs in crowded clusters on the trees grey with lichen. The Blackberry blossoms abundantly, but I learn that the berry is in flavour far below that which is yielded by the hedges of Kent or Surrey. The Furze, Bracken-fern, Tree-mallow, Foxglove, &c., are not more luxuriant, even when best sheltered from the wind, than we see them about London. It may be well to inquire why a climate which is so genial as to suit the Aralias, Dracænas, Palms, and Bananas, should be totally unsuited to even the hardiest stone-fruit, and should add nothing to the growth of the common English plants.

TEMPERATURES FOR 1872, 1873, AND 1874.

	Mean highest.			Mean lowest.		
	Scilly.	Guernsey.	Greenwich.	Scilly.	Guernsey.	Greenwich.
January	53·3	53·5	53·8	38·0	34·8	27·5
February	53·0	52·5	54·6	38·7	32·3	26·1
March	55·3	57·8	63·6	38·3	32·2	25·3
April	60·0	64·0	75·5	40·3	37·2	29·6
May	63·6	63·3	73·9	41·7	40·5	32·6
June	68·3	72·0	83·7	50·0	47·8	40·0
July	72·7	77·2	90·5	53·7	51·8	46·5
August	70·7	72·3	83·7	53·7	52·3	45·7
September	67·3	70·7	77·3	48·0	46·0	38·7
October	62·3	65·0	70·4	43·3	41·5	30·6
November	52·0	58·5	60·4	40·3	37·7	27·7
December	53·3	53·8	55·0	36·7	31·2	26·6

Through the kindness of Mr. Thomas, who has charge of the Meteorological observations in St. Mary's, I obtained copies of the Weather records for the years 1872–3–4, and place some of the observed facts in comparison with corresponding facts for Guernsey and Greenwich, in the preceding table, which shows the mean (for 1872–3–4) of the highest and lowest temperatures observed in the three places respectively.

We can from this table find the explanation of the freedom of growth given to some forms of vegetation, combined with the restrictions imposed on the development of other forms; for although the climate of Scilly is moist (37 inches being about the annual rain-fall, as compared with 24 for London) and the prevalence of foggy or cloudy weather is greater than at Greenwich, yet as the rain-fall during the summer months is not greater than that at Greenwich, and the proportion of direct sun-light is probably, during the same months, but little below that at Greenwich, neither of these two characteristics can account entirely for the failure of stone-fruit.

We observe then that at Greenwich there are only four or five months within which frost may not probably occur. In Scilly frosts occur but seldom, and then last usually only for a few hours. Hence a large class of plants which could not live without shelter at Greenwich during more than about four months in the year, can live permanently out of doors in Scilly. But as the summer in Scilly is not hotter than May in London, fruits which for ripening require a heat above that of late spring, find the island-climate unsuited to them. Obviously the English plants in Scilly which are at rest during winter get little or no advantage from the mild temperature at that season, while they are less stimulated to growth (during the cool summer) than they would have been in the neighbourhood of London.

I had not expected that a removal of only about thirty miles from the mainland, with but a small gain in latitude, as compared with the coasts of Devon and Dorset, could have produced so great an effect on vegetation as I here saw.

While looking at the foreign character of the foliage in the Tresco gardens, one is led to consider how far the facts there put before us serve to explain the remains of sub-tropical plants, which, geologists show us, occur plentifully in the clays and shales of countries where now a cold climate prevails. We learn from Scilly that if only the cold of our English winter be moderated, our summer is sufficiently warm for the vigorous growth of many plants indigenous to Australia, New Zealand, China, the Cape of Good Hope, &c.; and further, that this moderation of the winter cold can be effected by only a change in the extent of land surface compared with the extent of water surface. Before assuming a necessity for such gigantic variations as the shifting of our earth's axis, it is good to see how much a simple extension of water surface will account for as regards climate.

On glancing over the table, it will be seen that

Guernsey (which has more land surface in its vicinity than Scilly) comes, in respect of climate, between Scilly and Greenwich; and judging from Professor Ansted's work on the Channel Islands, the vegetable productions of those islands are intermediate in character between those of Scilly and those of the mainland of England.

My visit to the small island Annet (inhabited only by vast numbers of sea-birds) taught another lesson. The common thrift (*Armeria vulgaris*) is found plentifully in the islands, but in St. Mary's it exhibits no marked luxuriance. But in Annet it forms great hemispherical masses, often about 3 ft. in diameter, and nearly a foot in depth. I can only attribute this luxuriant growth to the abundant supply of manure furnished by the excreta of the birds which roost and nest on the island. At first sight few things would appear less dependent one on the other than a sea-gull and a thrift plant; yet here we see the presence of the bird influencing very greatly the development of the plant. If the gulls and puffins were driven away from Annet, one cannot doubt that by-and-by the thrift would dwindle, and then at some future period visitors might be sorely puzzled to account for the thick bed of vegetable mould on the island, which would seem to point to a vegetation almost requiring a tropical climate, instead of a vegetation due only to the existence of large numbers of sea-birds.

My own special "hobby" is "land-shells," but I must confess that the plants, the rocks, and the glorious sea-views so attracted me, that shell-collecting went on but feebly. The snails in Scilly were the better, and my boxes in London the worse, for the many interesting things that I found in the islands.

Since my return home I have thought that if three or four co-workers in a field-club or natural history society could make a visit, at the same time, to such places as the Scilly Islands, they could help one another greatly in their respective pursuits, and would do far more in the investigation of the locality than could have been done by them individually and alone. The evening meetings might be made most pleasant, and the hints furnished by one and another of the party would do much towards securing due attention to all the points of nterest in the neighbourhood.

I can scarcely picture to myself a more attractive summer holiday than such a visit to one or other of the islands, or groups of islands, around old England. To any of your readers who may bend their steps westward I would say, "See the Isles of Scilly, and don't be persuaded to give them one day only, but try if they will not furnish plenty of employment for a week or two, and still leave something to be found out by those who may follow you."

What wonder is it that I, having found in Scilly good and inexpensive living, people remarkably courteous and friendly, glorious weather, and good health, should be disposed to try the curious little archipelago for another summer's trip?

W. H. Hatcher.

THE LONG-TAILED WANDERER.

By W. H. Warner.

The charms of a walk in the woods have been said and sung many, many times; and if any of my kind readers would wish to see the merry little long-tailed wanderer free as air, then I would strongly advise them to take such a walk. Select some calm autumn day, when the trees are hung with orange draperies, when not a sound breaks the silence save an occasional laugh from a woodpecker, the merry twit of a nut-hatch, or the dreamy, half-melancholy song of the red-breasted robin singing in the depths of the wood.

But what is this long-tailed wanderer? I fancy I hear some reader ask. Is it bird, beast, or reptile? The "long-tailed wanderer" is a somewhat fanciful name proposed by a gifted naturalist for a gentle, funny little bird extremely well known to every country schoolboy. But stay; I am wrong: the gifted naturalist in question did not call my little feathered friend the "long-tailed wanderer" in English, but dubbed it *Megistura vagans*, which, however, when rendered in plain English, is nothing but "long-tailed wanderer" after all. What a wonderful thing is science! Putting aside further mystery, I introduce my subject to the reader as the Long-tailed Tit (*Parus caudatus*).

The autumn season has always appeared to me the most favourable for the studies of the ornithologist. In his woodland walks he may then make the acquaintance of a great number of birds, particularly the five common members of the Tit family. Three of these—the Great, the Blue, and the Cole tit—hunt busily among the oaks at this time, both for the sake of the caterpillars feeding on the leaves, and also for the fine fat grubs contained in the well-known galls (*Cynips Kollari*). To obtain the latter, the sharp little tit pecks large holes in the side of the gall. Acorns also form part of the tit's autumnal diet, having watched a Great Tit (*Parus major*) holding one of these on a twig, and pecking it open with its stout little bill.

But we seem to have forgotten our little wanderer. Listen awhile, and you will hear a perfect chorus of chirps and twits among the bushes; and if you look carefully in the direction from which they proceed, you may see a dozen or more little, long-tailed, black and white birds performing various acrobatic feats among the hazel twigs. Now a rough head, and then the tip of a long tail, will be seen stuck straight up in the air. Suddenly one of the party (presumably the father of the family) will take to flight, followed in straggling order by the others, till another tree or clump of bushes is gained, when the busy search, the chorus of chirps, and the gymnastic feats will be repeated. For seven months in succession these little tits lead a wandering, gipsy life, constantly moving from place to place, now gaily disporting themselves among the osiers and willows by the brookside, and now huddling for shelter under the thick boughs of the fir in the depths of the wood. At the approach of spring this little troop of wanderers give up their vagrant habits, separate into pairs, and settle down into quiet, stay-at-home married life.

And what a beautiful nest this pretty pair of wanderers construct!—how compact its form, how neatly woven, and how judicious the selection of materials! The family of wanderers break up into pairs, as I said before, at the approach of spring, and soon set about the important business of nest-building. This year (1875) I found a nest of these busy little tits so early as March 29th. The beautiful little structure was built in a furze-bush on the borders of a wood—a very favourite locality by the way. The middle of a sloe-bush is also a good place in which to look for the exquisite nest of the Long-tailed Wanderer. The form of the nest is nearly oval, with a small hole for entrance in the side, about an inch from the top. The materials employed are most firmly woven to the surrounding twigs. To remove the nest from its site without spoiling the beauty of its form is a by no means easy matter, indeed an almost impossible one. The chief material employed is moss, neatly woven, covered outside with a coating of beautiful, silvery-coloured lichens, and snugly lined with soft feathers. Then comes a nestful of tiny eggs, some plain white, others faintly speckled with pale red, and lastly a troop of future wanderers with tails as straight as carrots.

The young tits, on leaving their mossy, lichen-covered home, take their departure for other scenes, together with their parents, and till the following spring are veritable "long-tailed wanderers."

Standlake, Witney, Oxon.

Fig. 143. Long-tailed Tit (*Parus caudatus*).

NATURAL CURIOSITIES AT CHEDDAR.

AMONGST the many interesting localities included in the programme of excursions under the auspices of the British Association meeting at Bristol, was the picturesque and romantic little village of Cheddar, which is situated at the foot of the Mendip Hills, in Somersetshire, and not far from Wells. Besides the intrinsic beauty of the surrounding landscape, and the interesting features of the Mendip range of hills generally, there are at Cheddar two natural curiosities which have special attractions to all lovers of nature. They are the Stalactite Cavern and the rocky chasm known as the Cheddar Cliffs.

The Stalactite Cavern was discovered in 1837 by Mr. Cox, its present owner, whilst making excavations in the neighbourhood; when first investigated, it was found to be very damp and dirty, especially the floor, but this has since been covered with sand, and the whole cave made more accessible and convenient for inspection, without, however, detracting from its rugged aspect or in any way giving it an artificial appearance. It will be well for me, before entering into a detailed description of the interior of this most interesting grotto, to preface my remarks with a short explanation as to the origin and formation of those wondrous incrustations known as stalactites and stalagmites, which form the great objects of interest in the cave.

Stalactites are of frequent occurrence in limestone strata; they are produced by the gradual percolation through the fissures, abundant in these formations, of water saturated with carbonic acid; the acid, uniting with the limestone of the rock, forms carbonate of lime, which is slowly deposited from the calcareous solution upon the roof and floor of the cave. The long brittle pieces, in appearance like icicles, which depend from the roof are called stalactites, whilst those which incrust the floor are termed stalagmites. The time occupied in the deposition of these objects must in some cases be very considerable, extending even to thousands of years, as in the cavern of which I write there were two stalactites rather less than a quarter of an inch apart, and I was informed that during the thirty-eight years which have elapsed since the discovery of the cave the distance between them has not perceptibly lessened. This marvellous cave has been visited by multitudes, including many persons of note, all of whom have expressed themselves delighted with the wonders it unfolds, and tourists in the neighbourhood will be well repaid by paying it a visit, as its beauties cannot be fully described in words, but must be seen to be appreciated.

It is lighted throughout by small jets of gas, and entrance is obtained by a long passage, which opens up at its furthest extremity into three or four minor recesses; and all of these are incrusted with stalactites, some of them heavy and solid, others thin and fragile, whilst others again, like miniature columns, reach from the roof to the floor of the cave. As the visitor passes through the cavern, the attendant raises and lowers the gas, so as to exhibit the most striking effects, which could not be seen to advantage without the aid of a strong light. And, indeed, the effect, when thus regulated by the amount of light, is most marvellous. Some of the stalactites, thrown prominently into view, with their varied shapes and colours, call to mind the joints of meat hanging in a butcher's shop, whilst others, left in the shade afforded by some dark recess, remind one of the weird and fantastic figures of hobgoblins and other preternatural beings, such as are depicted and described in books of fairy tales. The colours, too, of these incrustations are very diversified, some being dark brown, some red, others again of a reddish yellow tint (probably owing to the abundance of sesquioxide of iron contained in them), whilst a fourth kind are of the purest white. Again, some are quite opaque, and others semi-transparent, the latter being, in many instances, of a light colour in the centre, with two or three darker stripes at the edge, much resembling a blanket.

Some stalactites, principally those which depend from the roof, bear so striking a resemblance to articles of household use that they have received the names of the objects they represent.

At different parts of the cave there are pools of beautifully clear water, in which the stalactites are as faithfully reproduced as in a mirror: the water contained in these little hollows is deliciously cool, but has rather an unpleasant mineral taste. The last feature in these beautiful objects to which I will allude is the wonderful power they possess of emitting remarkably clear and distinct musical sounds when struck; and so varied are these tones, that I believe it would be possible to find in the cave stalactites which would produce all the notes of the gamut.

There are other smaller caverns at Cheddar besides the one I have been describing, but as these are very damp, and not lighted with gas, besides being less plentifully incrusted with stalactites, there is nothing to be gained by paying them a visit. There is also a cave at Banwell, not very far off, called the "Bone Cave"; so named from the fact of its being completely filled with the bones of various animals (principally quadrupeds), supposed to have lain there for ages, but about which none of the inhabitants seem to know much; the cave being, however, in private grounds, and the charge for admission high in proportion to the convenience afforded, it is not so much visited as the stalactite cavern at Cheddar. The second great natural curiosity here is the vast fissure in the Mendip Hills which has received the name of the "Cheddar Cliffs." These cliffs, which at their highest point tower to an altitude of nearly 400 feet, form a tortuous chasm, through which a road winds for about the distance of a mile. At the commencement of the range stands what is called the "Lion Rock"; a solid block of limestone which bears a striking resemblance to the "king of the forest." After passing this rock the road is so circuitous in its course that a different view is obtained at each of its numerous bends. This adds greatly to the magnificence of the scene, in which bold masses of solid limestone form a good contrast to the darker foliage of small trees and shrubs springing up from the numerous clefts and ridges, and the overhanging ivy which festoons the cliffs. Here, too, rising out of the crevices may be found different species of ferns, but principally the common polypody (*Polypodium vulgare*); and it is in this particular locality that the rare pink (*Dianthus cæsius*) is to be met with; though it is scarcely prudent for the enterprising botanist who desires the possession of these rarities to attempt the ascent, which is attended with great risk, owing to the crumbling nature of the limestone rocks and the number of loose stones, which descend in a shower if you essay a scramble up the precipitous pathways, fit only for the feet of sheep, of which a few are to be seen far up the height; the pinks, however, and many of the ferns have been almost rendered extinct in this place, owing to the repeated raids made on them by women, who offer them for sale at an exorbitant rate.

At one point in the range a large rock, standing rather prominently forward, with its imaginary embattlements and turrets, somewhat resembling an ancient fortress, has received the name of the "Castle Rock." Having reached the end of the series of cliffs, it is advisable to ascend by a steep path on the right, and returning by the summit, a fine view from above is to be obtained. These cliffs being so lofty, rugged, and sharply defined, form a majestic and imposing sight by moonlight. It is not easy to account for the formation of this huge chasm, and different opinions are current amongst geologists as to the mode in which it has been made. Many suppose that a fissure, in the first instance inconsiderable, was produced, perhaps by shrinking, and that this fissure has been enlarged and hollowed out by aqueous agency until it assumed its present proportions. This supposition appears to be borne out by the tortuous course of the ravine, as if some swollen stream had been hollowing out a channel for its turbulent waters to run in, and had had its course deflected by the obstacles it met on its way. Collinson, who has written a history of the county of Somerset, gives a very graphic description of these cliffs, from which, in conclusion, I will make the following extract. He says: "Here indeed, Nature, working with a gigantic hand, has displayed a scene of no common grandeur. In one of those moments when she convulsed the world with the throes of an earthquake, she burst asunder the rocky ribs of Mendip, and tore a chasm of more than a mile in length. The vast opening yawns from the summit down to the roots of the mountain, laying open to the sun a sublime and tremendous scene, exhibiting a combination of precipices, rocks, and caverns, of terrifying descent, fantastic form, and gloomy vacuity."—*H. A. M.*

We have every reason to believe that the bed of the German Ocean was formerly dry land, and that the Forth, Tay, Tyne, and other British rivers flowing eastwards were tributaries to the Rhine, which at that time was a huge river passing down the bed of the German Ocean, and entering the Atlantic to the west of the Orkney Islands.—*Croll's "Climate and Time."*

SKETCHES IN THE WEST OF IRELAND.

No. 8. Aran Islands. (*Post-Christian Antiquities.*)

By G. H. Kinahan, M.R.I.A.

Illaunmore, or the largest isle of Aran, was one of the earliest Christian settlements in Erin. About A.D. 480 the island was given by Aengus, king of Munster, to Saint Einne, or Eude, who built a church and founded a school where the village of Kileany is now situated. In this island the ruins of churches and other post-Christian structures are extremely numerous, but unfortunately all, both here and in the other islands, are in a sad state of dilapidation. This is due to various causes:—after the ecclesiastical rule ceased, the islands seem to have been a bone of contention between the O'Briens of Clare and the O'Flaherties of Yarconnaught, one being the conquerors at one time, while at another the others were victorious; this brings us up to the time of Queen Elizabeth, when the Irish seem to have been driven out of them, the castle of Askin at the present village of Killeany having been her chief stronghold in Connaught: still more recently, the churches and other erections were dismantled by the soldiers of Cromwell to build fortifications, while at the present time neither the proprietor nor the inhabitants of the islands seem to put any value on the ruins, so that in late years irreparable damage has been done to them.

All the principal post-Christian structures seem to be included in the following list:—a round tower, churches, cashels, bultans, leabuidhs or labbas, aharlas or airlas, earhas or galtans, crosses, terminal crosses, loscas, cloghans, cœnobiums, and lauras. With these may be mentioned holywells for although not absolutely structures, they are nearly allied.

The ancient Irish churches have different names, according to their size and the age in which they were built. To give all these, however, would occupy too much space. In Aran the major portions are of small size, and of early construction. In some places in Ireland the early churches were built of wood, in others of stone, which seems to have depended very much on what materials came more readily to hand; and in Aran, as stones are abundant, they were used, the dimensions of the churches being usually about 16 ft. long by 12 ft. wide (fig. 144); having a plain Egyptian doorway in the west end (fig. 145); and a slip window in the east gable (figs. 146 and 147), the windows slightly varying in character, but being somewhat like the accompanying woodcuts. This, however, was not always the case, as in some places, on account of the situation being exposed, the doorway would not be placed in the west wall; while in others, seemingly on account of the nature of the grounds, the structures, as is usual in all Irish ancient churches, do not bear east and west. In some of the small churches, such as St. Kennanach on the middle island, there are peculiar stone projections (fig. 148), from the end walls that look like handles, and seem to suggest that the building was constructed after

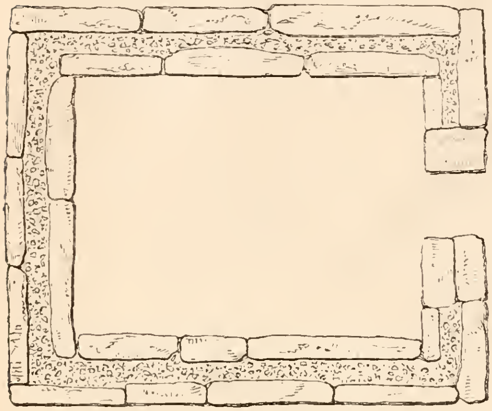


Fig. 144. Ground p'an of a small Cyclopean Church, showing the doorway in the east wall, the long stones, placed on edge, forming the inside and outside of the walls (3 feet thick) with rubble and grouting inside.

small wooden models, to which were attached handles for carrying them about. This, however, is mere conjecture, as nowhere in the annals has a record been found that mentions such a movable oratory. This small class of churches are supposed by Petrie to have been in general erected by the

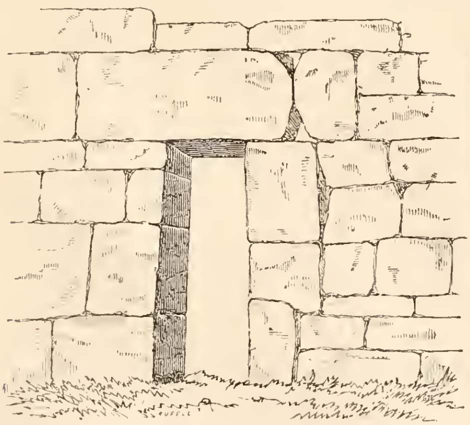


Fig. 145. Typical doorway of the Irish Type of Cyclopean Church.

persons after which they were originally named, and by them to have been used exclusively for private devotion. Many of them, however, have now lost the names of their founders, as prior to Bishop Malichi's time only Irish saints' names were used; but subsequently to his advent many of the old names were changed for that of the Virgin Mary or those of the apostles or other foreign saints. Stone altars were also introduced in his time, and where they occur in the old churches it is quite evident they have been a subsequent addition to the original building. All the early churches (which is also their characteristic in most parts of Ireland) are of that peculiar style of masonry termed Cyclopean or Pelasgic; large stones having been laid on edge in horizontal courses, without mortar, in more or less irregular courses, with their joints not always vertical, but having the stones neatly fitted together, thus forming the outer and inside portion of the walls, while the space between was filled with rubble

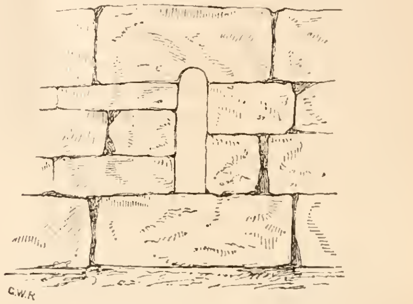


Fig. 146. Outside elevation of a slit window.

and thin grouting (fig. 144); also, except in the doorways, windows, and lower courses, the stones rarely extend as bonds through the thickness of the walls. Most of the churches on the Aran isles are of the small ancient type; some, however, are of later date, are more pretentious, and of larger dimensions, or even may consist of a nave and chancel: these later-aged churches usually have been built on the sites of older ones, and into the newer buildings parts of the older structures have been adapted.

The curious appendages to many of these churches called leabuidhs (labbas), or beds, evidently are introductions, some apparently being very recent, and constructed by interested persons to entrap the superstitious. Labbas seem to have grown out of St. Patrick having, in his wanderings, had to sleep at various times in out-of-the-way places, which afterwards were visited and slept in by his followers and disciples,—a practice in vogue at the present day in England in connection with the beds of some eminent personages. As St. Patrick had beds, other eminent saints had them also; and gradually it grew to be supposed they imparted virtues to their occupiers; from visiting the beds the custom easily graduated to visiting the final resting-places of the saints, so that now most of the labbas held in great veneration are the tombs of the early saints. These beds are rude structures. They are generally from six to eight feet long, roughly flagged, and inclosed by either rude walls or standing flags. Some of them are held in such veneration that rich persons come hundreds of miles to lie in them for a night, or, in some cases, only for a few minutes.

Structures that seem to be peculiar to Aran and that are allied to the labbas, are called Ahalas or Airlas. These are rude inclosures, some on mounds and others on flat places, but in both cases it is evident they at one time were burial-places. The origin of the name is very obscure; we will therefore give an epitome of Kilbride's description of them, and the probable derivation of the same.

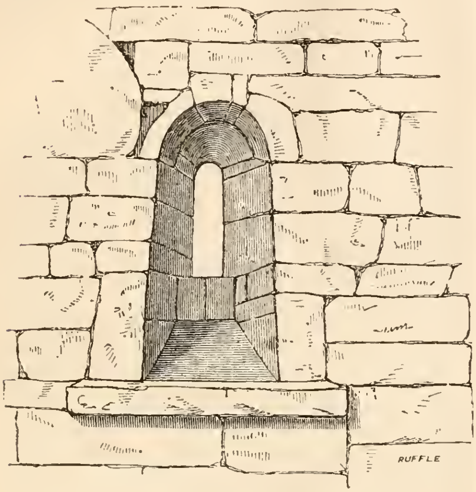


Fig. 147. Inside elevation of a slit window.

The Aharla (also called Labba ronan), near the village of Kilronan, may be described as the representative of its class. It is a small irregularly-built inclosure. At the east end is a rude altar,—a small limestone slab propped up by loose stones, over which, in the wall, is a flag with a cross and Ronan's name cut in it, the latter evidently being a very recent addition.

The Aharla serves a double purpose: it is resorted to by sick persons to be cured, in which it is similar to a labba; and it is used for public meeting, at which the people assemble for a general repetition of the rosary, and petitions to the saint or saints whose bones are said to repose beneath the spot. These public meetings for prayer are the great point of distinction between an aharla and a labba, but whether these meetings were the prime or sole reason of the origin of the aharlas, or only an accident arising from their previous use as a bed, it would be difficult to decide. The places are promiscuously called Aharla and Airle, and as the name has not been found in any book, nor does it occur in any of the dictionaries, which is correct is hard to decide. There are two Irish words from which the name may be derived,—*Airle*, a bed or couch; and *Otharluighe* (pronounced *O-har-ly*), from *othar*, sick or ailing person, and *luighe*, resting-place. From the latter the Rev. Mr. Kilbride considers "aharla" to be derived, but he cannot decide which name should be used. Perhaps, however, both are correct, "airle" being used synonymously with "labba," while

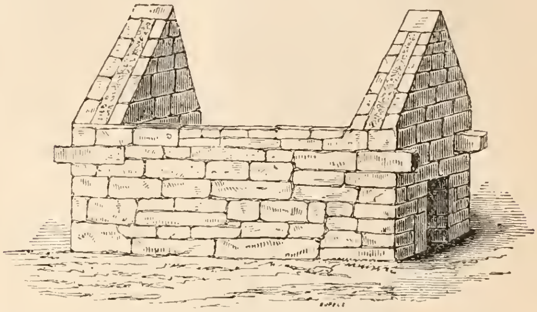


Fig. 148. North elevation of a small Church, showing the handle-like projecting stones.

"aharla" would be the word selected by a person wishing to give a name descriptive of the use to which the place was put. Although "labbas" and "aharlas" apparently are so similar, yet "in the islands where the two terms are in daily use, neither the words nor ideas which they convey are ever confounded."

MICROSCOPY.

The Use of Carbolic Acid in Mounting.—Some time since I gave some information about the use of carbolic acid in mounting insect dissections. Lately, in another number of your periodical, I see my application has been doubted. Let me ask any person who doubts the use of the acid to take a gizzard of any beetle or cricket—*fresh*—wash it, lay it open on a slide, touch it with a drop of pure carbolic acid, and leave it for a few hours,—it will become clear and bright; then apply the Canada balsam, and see if the effect produced is not better than by turpentine and other transparent-rendering liquids. As I said before, by heat it can be done in a shorter time than it takes to write this paragraph. A member of our microscopical society here applies it to zoophytes, &c., with equal success. Boil them in water to free them of air, apply the carbolic acid, then the Canada balsam,—a simple process, which frees them from air, and renders them more or less flexible and transparent, and can be mounted nearly immediately, without being rendered brittle, as by the ordinary turpentine process.—*T. Barnard, Kew, Melbourne.*

Cleaning Diatoms.—In cleaning Diatomaceæ for the microscope I am much troubled by the fine particles of sand, which abounds in this country, aud from which uo gatheriug is free. The acids have uo effect on them. Can any one suggest some way either of removing the sand or of picking out the diatoms from among it?—*St. T. H.*

A New Self-centring Turntable.—Mr. C. F. Cox, of New York, has contrived a turntable which is said to centre the slide uuerriugly, and is at the same time a convenieut working instrumeut. The slide is held, by pressure upon two diagonally opposite coruers, between two clutches, that are made, by a right and left screw, to move towards or from the centre simultaneously, and at a uniform rate. The ceutre of revolution must therefore coincide with the centre of the diagonal of the slide, which is the exact centre of a truly rectangular slide, and is practically the centre of any slide fit to be used. This very useful piece of apparatus is not patented. For all uew work, such as making varnish cells, or centring cells or objects of any kind, this turutable is said to supersede all others. For repairing old work, which may not have been well centred origiually, it should be provided with a spring clip, under which a mounted object can be centred by the conccutric circles in the usual manner, and which, when not in use, can be entirely removed from the table.

The Quekett Microscopical Club.—The last number of the journal of this well-known and practical society is uow out. It coutains papers, by Messrs. W. W. Jones "On an Instrument for Cleaning Thin Coveriug Glass"; on "*Bucephalus Haimeanus*, and another allied Organism," by Dr. Moore; on "The Relation of *Bucephalus* to the Cockle," by W. Fell Woods; and ou "The Organic Structure of Fliut and of Meerschaum," by M. H. Johnson, F.G.S. In the latter paper, the author states that meerschaum is a fossil sponge. The organic structure of flint may easily be made visible by staining thin chips with acetate of rosaline. Among the number of uodular bodies which Mr. Johnson claims to have made out as being of a decidedly organic character, are meerschaum, the Red Crag phosphatic nodules, septaria from the London clay, chalk flints, green-coated nodules of chalk rock, greensand phosphatic nodules, gault phosphatic nodules, oolitic bodies, ironstone in coal-measure sandstones, chert from mountain limestone, iron pyrites in the chalk, and the phosphatic nodules of the Lower Siluriau strata of North Wales.

ZOOLOGY.

A Contribution to Darwinism.—Under this heading Dr. T. Eimer has given an account of a peculiar lizard, nearly allied to *Lacerta muralis*, found on the uninhabited and rocky islets on the south-east coast of the isle of Capri. M. Eimer obtained the lizards thence for the purpose of ascertaining whether the conditions of isolation had not exercised some influeuce on them. Such, he thinks, is decidedly the case; aud the remarkable variety of lizard he now describes under the name of *cærulea* is so distinct from the type, that in the eyes of many zoologists it might be regarded as a species. *L. muralis* is a native both of Germany and Italy, and this new form of M. Eimer's differs less from the Italiau type than from the German. Not only is it different in its colour, as well as in the shape of the head, but likewise in its habits of life. From the conjoiued differences M. Eimer thinks that *cærulea* is entitled to rank as a species, although its affinities and habits clearly show from what stock it has sprung, and that it furuishes a striking example of what has been called "an incipient species."

The Colorado Beetle.—Much has been said and writteu, both in England and America, in regard to the habits of the "Colorado potato-beetle" (*Doryphora 10-lineata*), and the probabilities of its introduction into England and the continent of Europe. It is au insect that no country need covet, and therefore it is not surprising that foreign governments should be adoptiug measures to forestall it. But from my observations during the past three or four years, and especially within the last half-year, I thiuk the "non-importation of potatoes" from this country will not reach the case. Iu the first place, the females never deposit their eggs on the tubers, and the *larvæ* never feed on them. Early in spring, before succulent vegetation has come forward, and late iu autumn, when such vegetation is past, the mature beetles will prey upon the tuber; but this rarely occurs, except when the weather iu spring is prematurely warm, and then they will feed on almost auy kind of vegetation to which they have access. The last broods of the seasou in autumn go into the ground, change to a *pupa*, aud hyberuate there all winter. The *theory* in the Western States is, that the perfect beetles also go into the ground for hybernation, but we do not find this to be uuiversally the case here in the Middle States. I saw them last fall crawling uuder doorsteps, aud through cellar-grates, and other places of shelter, by scores, here in the city of Lancaster; and I also saw them come foith again, in the spring of the present year, from like places. In the fields many of them were found under heaps of rubbish during the winter. No degree of cold had any effect upon them. Last winter the soil was frozeu down from 3 to 5 feet iu depth, and continued so all winter; and yet the potato-beetles were dug up in February, only about 6 inches from the surface, with the earth around them as hard as a block of ice, and within half an hour after they were removed to a warm room they revived, and became as auimated as they are iu summer. Ou a late visit to Cape Henlopen I found hundreds of these beetles on the beach of the Atlantic, and every wave would wash up others, many of them still alive. At the Railroad "pier," which extends a quarter of a mile out into Delaware Bay, I found these insects scattered all along, even out to the end, where vessels are loaded with freight brought down from the interior; and here it is where the danger to England and other countries in Europe lies. Intercepted by the Atlantic coast, they will creep into any shelter—lumber piles, warehouses, vessels, &c.—and in this manner may be carried abroad in spite of the non-importation of potatoes.—*S. S. Rathon, Lancaster, U.S.A.*

BOTANY.

White Goosefoot (*Chenopodium album*).—Will some friend who is a chemist as well as a botanist kindly inform the writer what the saline incrustation on this plant is? It is very thickly incrusted all round the flower-buds, so as to be distinctly visible by means of an ordinary pocket lens. Is it potash, or what? Whatever it is, the plant must greatly exhaust the soil where it grows.—*H. Few.*

Re-discovery of Rare Plants.—It will no doubt interest your botanical readers to learn that *Malva borealis*, Wall. = *M. pusilla*, Smith = *Inparviflora*, Huds., has been rediscovered on the pebbly coast of Sussex during the months of July and August of the present year. There are four patches of it, with from twenty to thirty plants, within a distance of less than half a mile. How it could have so long escaped the keen eyes of botanists is surprising, as from the appearance of the older plants it is no doubt perennial. A specimen has been sent to the Royal Herbarium at Kew, and has been verified by Professor Oliver, who has retained it for the Herbarium. According to Hooker and Arnott, *Malva pusilla*, &c. &c., has been found but once in this country, and that at Hythe in Kent, eighty years since.—*C. A. O.*

English Plant Names.—Part I. of the "Dictionary of English Plant Names," by James Britten, is now going through the press, and Mr. Britten will be glad to have any contributions addressed to him on this interesting subject at the British Museum.

White Varieties of Flowers found in Warwickshire. — "*Scabiosa arvensis*, *succisa*, *Borago officinalis*, found at Allesley; *Primula vulgaris*, found at Allesley and Wootton; *Campanula rotundifolia*, at Allesley and Coleshill; *latifolia*, at Allesley; . . . *Campanula patula*, near Meriden; *Viola odorata*, Allesley; *Colchicum autumnale*, at Allesley; *Vaccinium Myrtillus*, fruit and flowers found white, in woods, Allesley and Corley; *Erica vulgaris*, *tetralix*, and *cinerea*, at Coleshill Heath; *Trifolium officinale*, in bogs near Coleshill; *Cnicus lanceolatus*, *palustris*, and *arvensis*, at Allesley; . . . *Orchis latifolia*, at Coleshill; *Conopsea*, bogs near Coleshill; *maculata*, Allesley and Coleshill. . . . It will almost immediately occur to any one, on perusing the above list, that the plants most apt to produce white varieties are such as usually bear blue, purple, or pink flowers. Yellow flowers are but little subject to variations in colour. The common cowslip, however, when raised from seed in a garden, is an exception, though in a perfectly wild state I never knew it to vary in colour."—*Rev. W. T. Bree.*

Double-flowered Wild Plants.—We have repeatedly met with flowers of corn feverfew (*Matricaria inodora*) somewhat like those described by "R. W." in your August number. They consisted wholly of ray florets, those which ordinarily occupy the disc being absent. Sometimes the florets were most symmetrically set, which gave the blossoms a cultivated appearance; whilst others were intermixed with green, narrow, branched segments like rudimentary foliage. These curious varieties occur in fallow-fields in winter or early spring, and are long-lived, surviving all perfect flowers of the same species. Their longevity is due, I suppose, to their close double structure, the want of stamens to effect fertilization, and the time of year when they are to be found. The common daisy may be seen with double or multiplied rays, though these are not so numerous as to affect the hemispherical form of the disc. The petals of the outer florets of cow-parsnip (*Heracleum sphondylium*) and florets in the head of Dutch clover (*Trifolium repens*) are sometimes double. We have also observed another sort of doubling, or rather malformation, in which a stem of daisy or dandelion much compressed, especially at top, has caused an oblong single, semi-double-triple flower-head to be produced; the half flowers linked together by what may be termed a confluent neck, one calyx binding the whole and making in its course, in consequence, a waved outline. And as great a peculiarity in the ribwort plantain (*Plantago lanceolata*), where the stem has supported a spike bearing lateral spikelets. —*R. D.*

Variegated and Ornamental Foliage of Wild Plants.—Single leaves of many species are frequently seen blotched, streaked with yellow, or blanched; but we have witnessed through spring and summer the growth of a garden-like variegation of bright yellow in the dropwort (*Spiræa filipendula*), bramble (*Rubus fruticosus*), spear and creeping thistles (*Cnicus lanceolatus* and *arvensis*), and daisy, and of light yellow in rest-harrow, Dutch clover, and bird's-foot trefoil. The milk thistle (*Carduus mari-*

anus) has what may be called "ornamental" foliage; and the black horehound (*Ballota nigra*), which here on bare, sunny spots of magnesian limestone, throughout its entire growth, except in its blossoms, is uniformly black, may be said to have the same.—*R. D.*

Sium latifolium in Wiltshire.—I have lately observed this plant on the banks of a canal near Swindon. Has it been before recorded as growing in Wiltshire? I cannot find any mention of it.—*Wm. A. Clarke.*

Monkey's Cup.—The description below, which I have copied from Dr. Masters' work on "Vegetable Teratology," seems to explain the phenomenon provincially called "monkey's cup."—"*Ascidia*, or Pitchers.—These sometimes occur from the cohesion of the margins of one or more leaves; but there is another class of cases (and it is to this that I think the monkey's cup belongs) in which the tubular formation is due not so much to the union of the margins of a leaf as to the disproportionate growth of some portions as contrasted with others, whence arises either a depressed cavity, as in the case of a leaf, or an expanded and excavated structure, when the stem, or some portion of it, is affected. In cabbages and lettuces there not unfrequently occurs a production of leaf-like processes projecting from the primary blade at a right angle. Sometimes these are developed in a tubular form, so as to form a series of little horn-like tubes or shallow troughs. It is not easy in all cases to trace the origin and true nature of the ascidium, as the venation is sometimes obscure. If there be a single well-marked midrib, the probability is that the case is one of cohesion of the margins of the leaf; but if the veins are all of about equal size, and radiate from a common stalk, the pouch-like formation is probably due to dilatation and hollowing of the petiole. When the result of a union of the margin of the leaf, the pitcher is generally less regular than when formed from the hollowed end of a leaf-stalk." Much information is still needed as to the mode of development and formation of these tubular organs. —*M. B. D.*

Laburnum.—The laburnum with yellow and purple racemes growing on the same branch, which "L. A. B." inquires about in Science-Gossip, p. 187, is the purple laburnum (*Cytisus Adami*). This interesting tree is not uncommon, but there are different opinions as to its origin. It seems to be a hybrid between the yellow laburnum and the dwarf purple cytisus (*C. purpureus*), as besides the yellow and purple racemes on the same branch—sometimes intermingled in the same cluster—there are usually tufts of *Cytisus purpureus* scattered about amongst the branches; thus showing both parents. They are intermixed apparently without any sort of order, sometimes one predominating, sometimes the other, but generally there is most of the "purple laburnum," unless some branches are allowed to grow from the stock, which is either the common or Scotch laburnum.—*A. B., K.*

Adiantum Capillus-Veneris.—I am glad to see some one takes an interest in the Manx Flora. I have worked very hard at it myself for several years, and hope towards the close of this year to have a small volume before the public, made as interesting as possible by much folk-lore of plants, &c., as well as a notice of all the remarkable festivals, &c. The folk-lore of the island is very rich, but is fast dying, and will in a few generations be almost forgotten. In reference to the Maidenhair fern, I have proof of its existence at Peel and Glen Meay ten years since: it is now very rare, but is still found in one of the noble glens, not far from Glen Meay. I have in my possession, through the kindness of a friend, Professor E. Forbes's MS. Flora and notes on the distribution of the island flora geologically considered. The small geological map, prepared and coloured by the late lamented Professor Forbes, will be deeply interesting to all lovers of natural science, who were his friends. We hope to have a fac-simile in the work, if sufficient subscribers can be found to take the first edition.—*J. F. Robinson, Frodsham.*

Hierochloe borealis.—With respect to the time of flowering of the Northern Holy-grass, my experience differs somewhat from the conclusion arrived at by Mrs. Edwards in her interesting paper in Science-Gossip for August, p. 177. I had a living plant sent from Thurso, which has flowered with me twice, and each time in the middle of April. It cannot surely be, that even a change of soil and habitat should have accelerated its flowering three months. I think, therefore, that Withering and Hayward, and especially Bentham, are all mistaken. I may remark, too, that the observation in the paper alluded to, that the leaves of the grass are short, and the woodcut representing only a flowering stem, may possibly mislead readers as to the herbage of the plant. The leaves of the barren stems are rather remarkably long. I inclose a medium specimen. You will see that the lamina exceeds 18 in. The produce is therefore considerable in an agricultural point of view, but it would turn out, if cultivated, a most troublesome couch grass. The odour, unlike that of woodruff or the sweet-scented vernal grass, is emitted from the *growing* plant.—*R. W.*

Sinapis arvensis.—In the July number of Science-Gossip, p. 186, J. R. Thomson asks if "any reasonable explanation has been given of the unfailing appearance of *Sinapis arvensis* on ground that has been newly turned over." The seeds of charlock and several other plants will lie dormant, if buried too deep in the soil, until such time as they are brought near enough to the surface, when they will spring. Amongst others may be mentioned the common Poppy (*Papaver Rhœas*), which in some places, where it had not been seen for a very long period, when the soil has been turned up to a greater depth than usual, will spring up in the greatest profusion. But as soon as the surface gets covered with other plants it disappears, and remains in a dormant state until circumstances are favourable to its reappearance. Our highest authorities consider the above two plants only as colonists in this country. Their introduction must date a long way back, as they will sometimes turn up where there is no appearance of former cultivation, and also from a greater depth in the soil than cultivation usually reaches. When the railways were newly made in this district (the South-east of Scotland) the sides of many of the "cuttings" were literally covered with poppies, more particularly when the cut was through any of the gravelly "knowes" which are frequently met with in the district.—*A. B., K.*

GEOLOGY.

On the Distribution of the Graptolites in the Lower Ludlow Rocks, Ludlow.—At the meeting of the British Association, Mr. J. Hopkinson, F.G.S., &c., in speaking on this subject, drew attention to the special interest attached to the Ludlow Rocks in connection with investigations on the vertical distribution of the graptolites as being the formation in which they apparently died out. It was shown that several species of *Monograptus* abounded in the lowest beds of the Lower Ludlow when these lowest beds did not, as they did near Stokesay, form a limestone divided from the Wenlock limestone by a few feet of shales. Among other characteristics of the strata was found Aymestry limestone, which the author considered formed a portion only of the Lower Ludlow rocks, not being constantly present, and sometimes having beds of Lower Ludlow shales of considerable thickness between its layers. He concluded by showing the dependence of the fossil fauna of these rocks on the physical conditions of the Lower Ludlow seas, the fossils being only locally distributed, and varying slightly in their horizons according to the nature of the sediment deposited, the graptolites especially being influenced by the changes of sea-level, &c., to which their final extinction was considered to be most probably due.

The Discovery of a Submerged Forest in the Estuary of the Orwell.—In the Geological Section of the British Association Mr. J. E. Taylor, F.G.S., discoursed on this subject, and said his attention had been drawn to some peaty material which came from the bed of the river Orwell during the excavation of a new channel. Further investigation proved it to be 7 ft. to 9 ft. in thickness, full of recumbent trees, such as dwarf oak, pine, alder, &c., the lower part resting on a marl of fresh-water shells, &c., underneath which was the solid chalk. The peat was buried beneath 4 ft. or 6 ft. of black river-mud. A series of thirteen excavations and dredging conducted last November proved that the submerged forest extended for seven or eight miles. The peat bed, on an average, was about 9 ft. (in some places 14 ft.) below low-water neap tides. The tide rose 12 ft. to 14 ft., and therefore, even if the old forest had grown at the sea-level, it must have stood about 30 ft. lower than we now find it. Mr. Taylor then referred to other post-glacial forest beds along the eastern coast, and expressed his belief that they represented the last stage of the continental condition of England before the depression took place which brought the North Sea over the low-lying plains, and so formed the present German Ocean. Some fine perfect teeth of the mammoth (*Elephas primigenius*) were found in the Orwell forest-bed, and exhibited.

Fossil Salamanders.—M. Gaudry, in a recent number of the Bulletin of the Geological Society of France, describes some new genera of fossil salamanders from the Upper Coal-measures of Meuse and Millery, France. Remains of the skeletons of seventeen individuals were found, ranging in length from an inch and a half to nearly three inches. There are twenty-nine vertebræ, three cervical, ten dorsal, eight lumbar, and eight very small caudal. The ribs are very short, and there are only traces of a pelvis, owing probably to its having been incompletely ossified. The fore and hind limbs are about equal in length, and each four-fingered. The name given to this new form is *Protriton petrolei*. It is nearly related to *Pelion Lyelli*, of the Carboniferous formation in Ohio, U.S.

NOTES AND QUERIES.

Basalt.—Permit me to thank Mr. F. W. Rudler for his letter in Science-Gossip, No. 128. He allows that it is difficult to trace a beginning for phosphates in igneous rocks; so that there seems no reason to say, as the *Athenæum*, No. 2,479, said, that igneous rocks are the probable source of phosphates in sedimentary rocks. As regards this question, I am at present quite satisfied,—basalt remains where it was. I am referred to able geologists' discussions. I have been doing so for some years, and have looked over vast areas of basaltic rocks. Science tells me basalt is a rock of igneous origin. I have denied this; last in the *Geographical Magazine* for August and September, 1874. I do not deny that sedimentary basalts may be converted into lava, or that, after being fused, they may return to their normal appearance. I do, however, say, that wherever there is basaltic lava, there was previously sedimentary basalt. I also say that sedimentary basalt exists in its normal condition! I do not intend to be dogmatic. If any one can show that basalt cannot be sedimentary, I will accept the proof.—*H. P. Malet.*

A Difficulty.—I should be glad if some of your correspondents could enlighten me in a difficulty. On the hills near Caterham junction, and in the whole of that neighbourhood, the juniper grows in great abundance, but it is always a little low bushy shrub. But a few miles further, near Mickleham, Boxhill, and thereabouts, the shrub is exceedingly common, but it invariably reaches a considerable height, say from 10 to 15 feet. I should be glad to know if the smaller kind is the *J. nana*, and the larger the *J. communis?* There is as much difference in the general appearance of the shrub in these two different localities as between the *Ulex europæus* and the *U. nana;* and I have found it very difficult to find any permanent difference between these two plants except in the manner of growth. Both Smith, Hooker, and Withering say the *J. nana* is only found on high mountains, which makes me doubtful as to the smaller being it; at the same time the soil is chalk in both the localities I name, and therefore there seems no reason why it should be found of such different sizes within so short a distance.—*H. E. Wilkinson, Anerley, S.E.*

Swallows.—In reply to "M. A. W." in Science-Gossip, p. 190, I may say that I have noticed three swallows on several occasions attending one nest. I have not observed three birds to a nest in any species but the Swallow and the Starling. The subject is well worthy of investgiation. I have seen no explanation in books. Is the odd bird a young one of the previous year, an additional female linked with the male, or an occasional visitor, and does the extra bird remain to the end of the breeding season? —*Geo. Roberts.*

The Irish Arran.—In Science-Gossip, Aug. 1st, the writer of "Holiday Rambles" inquires playfully if there is not a "Rock" somewhere in Galway Bay of the name of Arran. The "*Rock*" in Galway Bay is rather a respectable one. It covers an area of 11,287 acres, and affords occupation and a means of subsistence to over 3,000 people, or at least it did a few years ago. On this "*rock*," too, in olden times, the good seed was sown and took fruitful root, for over twenty churches once consecrated its soil. It consists of a group of small islands, one of which, Arranmore or Inishmore, the Island of the Saints, still invites devotees as well as tourists to visit its sacred shades. There can be little doubt that your correspondent sought his *Ajuga pyramidalis* and *Helianthemum canum* in the *wrong* Arran, as he himself suspects; for Hooker names W. Ireland, Arran Isles, as the *habitat* of both plants, not Arran, county of Bute. Perhaps, then, if the pleasant writer of "Holiday Rambles" will bend his steps, when next he makes a holiday ramble, to the "*rock*" in Galway Bay, he may meet with his quest, and see much worth seeing besides.—*Isabella H. Knox, Belfast.*

Livingstone's Sponge.—In Livingstone's "Last Journals" frequent mention is made of sponge that was found in the streams through which the sick man had to wade. This sponge extended from the banks and made the fording very difficult. In vol. i. p. 113, it is described as "a bog or sponge, a peaty loam floating on sand." At pp. 324-5, these sponges "consist of a black, porous earth, covered with a hard wiry grass," and "streams of oxide as thick as treacle .... move along in the sponge like red glaciers." In this sponge the water is always "circulating and oozing." What is this sponge? In some of our chalk springs we have little fibres attached to the water orifice, like small brown roots. They are not roots, but little threads of earthy matter, soft and friable, held together by a shining silicious coat. I have accounted for these fibres by the silicious matter in the chalk covering and holding together earthy matter issuing with it; but, says Livingstone, p. 213, vol. ii., "Flint does not exist in any part south of the equator." If that which we commonly call flint does not exist, we know that varied forms of silex exist in the South-African diamond fields; and at p. 325, vol. i., Livingstone writes, "the water descending about 8 ft., comes to a stratum of yellow sand, beneath which there is a stratum of fine white sand." This sand must be formed from broken-up silicious rocks, so that in our own water-springs we may find a resemblance to the sponge in the brooks on the great plateau of Central Africa, from whence come (p, 327) "the secondary sources of Zambesi, Congo, and the Nile." In our spring-heads the fibres are short; where there is nothing to adhere to, the liquid silex goes on with the water. In Africa there is more material to be clothed than there is clothing for it; hence, the red oxide moves along in defined streams through the fields of sponge. Sponge is not a proper term for this substance. Can you, Sir, or your readers, help me to a correct one? Of course, the fibre in our own springs has a name, but in the absence of reference-books I do not recollect it. As hair when collected into masses forms horns and hoofs, as silicious matter when collected from springs grows into sinter; so these fibres are related to the sinter, and may be called the *beard* of the water-spring, if there is no name already given to them.—*H. P. Malet.*

Colours of Canaries.—In connection with W. T. Greene's query as to Cayenne pepper, noticed in Answers to Correspondents (August No.), allow me to state that Norwich canary-breeders use it to *change* the colour of their birds. Their feathers after moulting come of a deep orange-colour, but their breeding powers are interfered with. Pounds of cayenne are sold annually for this purpose.—*W. G. P.*

Laburnum Flowers.—The purple and yellow flowers sent to "L. A. B." are in all probability the result of grafting. The first purple laburnum was produced in Paris. It was a hybrid between the Swiss Cytisus and the *C. purpureus*, a native of Carniola. The branches below the graft generally produce yellow flowers and those above purple; but it is not very uncommon to find both coloured blossoms on the same cluster.—*Helen E. Watney.*

Late Flowering Laburnum.—On my way up to town one morning in the last week of August I noticed a laburnum-tree coming fully into flower. The branches were covered with blossom, also making new wood. Is not this very unusual?—*J. W. G.*

Cottage Pharmacy.—A prize offered at a cottage-garden show in this neighbourhood "for the best collection of herbs used for physic, poultices, or salves, with the common name of each and of the ailment for which it is used," produced the following collection: — Foxglove, robiny (locally black bryony), figwort, watercress, hart's-tongue, red campion, sloe, elder, eyebright, chickweed, mint, wortleberry, hop, wallsrue, woodsage, yarrow, St. John's wort, pimpernel, knobgrass, birdsfoot trefoil, oak polypody, centaury, featherfew, dandelion, house-leek, agrimony, mosses, nightshade, nettle, blue-bottle or cornflower (devil's bit), herb-Robert, meadow-sweet, groundsel, furze, mallow, balm, broom, cleavers, water-alder, arssmart, persicaria, burdock, woundwort, knapweed, plantain, camomile, daisy.—*W. R. B., Cotford, near Sidmouth.*

Living Leaves.—In Miss Weppner's account of her visit to Java ("The North Star and the Southern Cross") the following passage occurs:—"One day Dr. Scheffer took me to the residence of Madame Theissen, a very celebrated gardener. In her garden I first saw the so-called 'living leaves,' which are no doubt the most interesting plants in creation, and which I have seen but once on my journey. They consisted of beautiful green shrubs in large flowerpots, the branches and leaves of which were all little insects which had emerged from the eggs of the plant. When the insect is still, it looks like a well-formed green leaf on a little branch; but when it moves about, the leaf forms the body of an insect, and leaf and stalk, in the form of an insect, hops away upon the branch. When the insect settles down again, it once more becomes a leaf and stalk, and when seen motionless has not the least appearance of a living insect. Mrs. T. told me how she brought up her little plants, and honoured me by giving me a few leaves and branches of these wonderful creatures, preserved in spirits of wine. She held the small green branch with the leaves above the neck of a bottle, into which they swarmed briskly enough; but they were followed by the spirits of wine, and all the living branches and leaves died. Madame Theissen also put in a handful of the little eggs, from which spring the living leaves, and the development of which forms the transition from the vegetable to the animal kingdom." I suppose the so-called leaf or stick insect is here described; but possibly some of your readers may be able to throw some light upon this curious description. At any rate the fact of their being thus grown (?) in flowerpots seems worth chronicling in the pages of Science-Gossip.—*R. H. Nisbett Browne.*

The Puss-moth Caterpillar and its Syringe.—That this caterpillar can eject from a rosy slit beneath the chin a pungent liquid of an acid nature is now recognized as a fact, though at one time some entomologists questioned it. One is not prepared to say that the insect is furnished with this special protective function so that it may ward off intrusive entomologists, yet it must be intended to keep some enemy at a distance. The common notion is, I believe, that by this means the caterpillar drives away (with more or less success) ichneumons of the hymenopterous order. But I find that, probably from its showy colours and its mode of parading itself, the caterpillar of the Puss-moth (*D. vinula*) is frequently picked up by birds, especially when about half-grown. Hence, nature may have furnished it, as it approaches maturity, with the means of ejecting this fluid, so that any bird flying up with the intent of carrying it away may be deterred thereby. It is a fact that the caterpillar has sufficient muscular force to propel the fluid 2 or 3 ft. through the air. I cannot see that in the case of insect foes the fluid would help the caterpillar, though possibly with these the threatening anal appendages are of utility. And it is remarkable that when in confinement this caterpillar ceases to exercise the power of ejection; if it is annoyed or irritated, the mouth of the orifice will be briskly agitated, but no liquid proceeds from it. As far as my observations go, it is only after the last change of skin that the Puss-moth caterpillar acquires this peculiar apparatus.—*J. R. S. C.*

Animal v. Vegetable Life.—In your August No., under the above heading, you state that a friend wishes to destroy some horse-leeches, but not her water-lilies, both in the same fountain. Advise her to buy a flask of sweet oil, which both animal and vegetable life would enjoy; the leeches will satiate on it till they burst, and it will not harm any living plant.—*W. F. Bell.*

Lathrea squamaria.—In the August No. you ask the habitat of *Lathrea squamaria.* I beg to inform you it grows in the neighbourhood of *Neath*, and when it is in flower, only *in the middle* of April, I can procure it in abundance.—*W. F. Bell.*

Brown Beetles.—If "W. L. M." will try parings from the rind of cucumber, I think he will find it effective in destroying the "brown beetles" he complains of. It appears to poison them.—*F. E. F.*

Birds and Flowers. — Referring to E. Edwards's note in the September No. of Science-Gossip under this head, allow me to state, that I have for several years noticed the ravages made by the "house-sparrow" on the blossom of crocuses. The birds appear to me to have a partiality for the yellow flowers. I have always thought that they were attracted by the saffron contained in the blossom. Those I have observed have generally eaten most of the petals.—*F. E. F.*

Microscopy.—Will any reader of Science Gossip oblige me with a small list of seeds which make good opaque objects? I shall also be obliged if any one can tell me of a varnish that will keep glycerine in a cell; as I have tried damar, gold size, &c., without success.—*F. E. Fletcher.*

Death of Hedgehogs.—I notice in the July No. "T. H. A." mentions two cases of hedgehogs which he had bought falling asleep shortly after he had brought them home and dying within a few days. I once had the very same thing happen to a squirrel which I had bought in the streets of London. It was quietly sitting upon the man's hand, and he assured me that it was perfectly tame. It fell into a stupor shortly after I got it home, and died within three days. I was at the time told by a friend that it is a not uncommon practice to give a small dose of arsenic, which will render the little creatures senseless, or as the men call it, "perfectly tame," at first, but is sure to prove fatal in a short time, according to the strength of the dose. I do not see how it could serve the purpose of an established bird-fancier who has a reputation at stake to practise this cruel trick, nor can I imagine why hedgehogs, which are so quiet in habit, shoubld be subjected to such treatment. Yet this seems to me the most likely cause of the two deaths which "T. H. A." mentions. Since purchasing my squirrel I have several times seen men in Cheapside with so-called tame squirrels, and have more than once warned intending purchasers of the trick which was being played upon them.—*Spedding Curwen, Upton.*

Botanical Experiments.—I am much interested in these, as I am trying the same thing myself, and hope to be more fortunate in following the matter out than the other correspondents seem to have been. My acorn was dug up three years ago with the root and stem well sprouted; it was suspended over a white glass bottle full of water, which has been kept constantly filled up as required; it made 3 inches growth the first year, 1½ inch the second, and 3¼ inches in the present year, and has now four leaves, but no side branches. It has made a quantity of small fibrous root, which has got very dark and dirty-looking; and there is a deposit of dark flocculent matter at the bottom of the glass, probably dust and a discharge from the roots; the water otherwise remains perfectly clear. I have also two horse-chestnuts in water two years old; one in a greenish glass, the other in a blacking-bottle, as I wish to see if keeping the roots in the dark makes any difference. I notice that in the spring the buds first swell nearly to bursting, then the roots begin to grow rapidly, and make some growth before the leaf comes out; they hold their leaves much longer than usual into the winter. All these are in the window of a warm room, and have never had a drop of water or moisture on their leaves. I am about to treat some others in the same way, but put them out of doors, and let them have the rain, &c., as usual. The first ones will remain as they are, except shifting into larger water-jars, which they now want. The ultimate result of this continuous water-treatment I hope to be able to record in Science-Gossip.—*H. F., jun.*

Cats and Music.—I had a cat which acted in an amusing way when I was playing some tunes on the harmonium, but I don't think the liking for music is confined to one animal. A robin about our house, when it heard the music, would constantly come and sit by the window and whistle in the most vehement way as long as the instrument was played, and the thrushes sometimes do something of the same kind. I fancy the description of music makes some difference. The higher notes seem to please best, but I am not sure.—*E. T. Scott.*

Stratagems of Birds.—A few weeks ago, as I was walking in a country lane near Shrewsbury, my attention was attracted to the motions of a chaffinch whose behaviour was very eccentric. It flew out of a hedge, and fell down close in front of my feet, and commenced rolling and tumbling about as if its wing was broken, but would not let me catch it. When it had led me in chase for some yards, it jumped up and flew away. It had a nest in the hedge close by, and was evidently trying by this stratagem to lead me away. I have heard of the partridge acting thus, and should like to know if any of the readers of Science-Gossip know of a similar instance to this.

How to Bleach Ferns.—A friend of mine has some dried ferns which have been prepared in some way so as to render them bleached and almost transparent. I have not seen them myself, but those who have speak of them as being very beautiful. The particular way in which they have been treated seems to have been kept a secret. I have been asked, however, to try and find out, and I do not know how I could do better than apply to you; and I should be much obliged if, through the medium of your valuable journal, you could obtain for me any information on the subject.—*J. F. D.*

Laburnum.—As the query of "L. A. B." (p. 187), on the occurrence of yellow and purple flowers on the same tree, has not as yet elicited any response, the following facts with reference to this phenomenon may prove interesting. The plant known to gardeners as the Purplish-flowered Laburnum is a hybrid between the common yellow Laburnum and a small purple-flowered Cytisus. This latter differs from the Laburnum in the shape of its leaves, in its shrubby habit, and in bearing its purple flowers in much smaller clusters. The hybrid very closely resembles the Laburnum in habit, and differs from it in little except the colour of the flowers, which are of a reddish purple. This hybrid has a remarkable tendency to revert to the original forms of which it is compounded. Thus in a tree of which the majority of the flowers are purple, there are frequently several branches bearing yellow clusters, while here and there a bunch of the little purple Cytisus may be seen peeping out, the shrubby habit of which gives it much the aspect of mistletoe. The plant is generally propagated by grafting, and probably, like other hybrids, does not bear fertile seeds, except in such parts of the plant as have reverted to the characters of one or other of the parents. Such seeds would doubtless reproduce their own kind and not the hybrid. There seems to be some little obscurity as to the exact mode in which this hybrid was originally produced: the subject is discussed at some length in Darwin's "Variation of Animals and Plants under Domestication."—*F. V. P.*

Laburnum. — In Science-Gossip for August "L. A. B." asks for information respecting a branch of laburnum bearing both purple and yellow flowers. As nothing has been elicited in the present number (September) that has the slightest bearing on the subject, I beg to give a quotation from the "Treasury of Botany." After mentioning the *Cytisus Laburnum*, it goes on to state that "*C. purpureus* is an elegant procumbent shrub, a native of Carniola. It seldom exceeds a foot in height, and is either used for ornamenting rockwork, or is grafted on the Laburnum. *C. purpurescens* (Fr. C. d'Adam), the purple Laburnum, is a hybrid between the two preceding. It was originated in Paris in 1828, by M. Adam, and has since been much cultivated in England. A peculiarity of this tree has often been noticed, which is interesting to the physiological botanist, as showing the influence exercised by the stock on the scion. 'This purple Laburnum is a hybrid between the common yellow Laburnum and *C. purpurescens.* The branches below the graft produce the ordinary yellow laburnum flowers of large size; those above often exhibit a small purple laburnum flower, as well as reddish flowers, intermediate between the two in size and colour. Occasionally the same cluster has some flowers yellow and some purple' (Balfour)." This variety certainly cannot be depended upon to come true from seeds. It must be propagated by budding or grafting. Now, a word in regard to the assertion of E. T. Scott. It is a well-known fact, that, under certain conditions, many flowers will change one or two shades from their normal colour, and regain it when those conditions do not obtain. The common Hydrangea is a familiar instance. However, I never heard of any such radical change as that from purple to yellow. Let E. T. Scott take pains to prevent bulbs or seeds of the yellow crocus from becoming mixed with the purple ones, and I think he would have to wait a very long time before such a thing would occur. I can believe what E. T. Scott says about the Heartsease, as that is such a very variable plant, but I beg to differ altogether about the Croci.—*Geo. Nicholson, Kew.*

Cats and Music.—In the last number of Science-Gossip an instance is given of the effects of whistling upon a cat, in which it is stated that the animal listened to a tune with evident pleasure. My experience, however, in regard to this differs from that of "E. J. T." A relative of mine has a cat—a noble animal—rejoicing under the refined name of "Thomas." This creature dislikes to hear any one whistle. But one morning, when he was fast asleep, I whistled loudly. It acted like magic. "Thomas" started up in an instant, looked very bewildered, and decamped from the room at full speed.—*Geo. O. Howell.*

Swiss Flora.—As a *Manual* for Swiss flowering plants, with descriptions very much to the point, though necessarily very brief, I can strongly recommend P. Morthier's "Flore Analytique de la Suisse," second edition, Aug., 1872. Price 4 fr. 50 c. Publishers, Sandoz & Fischbacher, Paris.—*W. Moyle Rogers, Stapleford, Salisbury.*

How do Crickets Sing?—The crickets were singing their shrill song a few hundred yards from my house of late, and I said, "Let any wild beast come under my roof rather than those insidious pests; where they are, sleep is banished for evermore!" The very next evening there was the first touch of autumn in the fresh cool air, and on coming home from a walk I heard a cricket's voice resounding in every room of the thin-walled town villa. So I set to work, found him comfortably ensconced for his winter quarters behind the skirting-board by the kitchen-stove, and by a plentiful administration of hot water I soon had him a martyr to science under the microscope. I then hunted through all the amusing "Cricket" notes in the back volumes of Science-Gossip, for information concerning the manner in which this noise is produced. And I must say I found very great difficulty in believing that this *chirp* proceeds from the mere *wing* of a rather delicate white insect possessed not even of the hard wing-case of the beetles. I shall be very glad if any of your correspondents will kindly furnish a sketch in your next number of Science-Gossip, together with an account of the exact locality and process of producing this so-called music. The under gauzy wing has a beautiful striped membrane that ends in a firm, almost horny point; but the upper wing is almost as gauzy, and seems quite incapable of originating any friction. May I not be allowed to believe that the peculiarly muscular thighs of the insect are the secret of its powers, and that, as I believe the grasshopper does, he rubs them together for his wife's delectation at their evening party?—*W. E.*

Laburnum with Yellow and Purple Racemes.—What "L. A. B." describes is no doubt *Cytisus Adami*, sometimes called *Cytisus laburnum purpurescens*, I believe. Any way it is a hybrid variety, said by some authorities to have originated at Rouen. There is here a large specimen which annually affords three distinct forms of blossom:—(1) The usual yellow racemes; (2) short racemes of a rosy purple colour; and (3) blossoms of *Cytisus purpureus* proper, these latter being borne amidst dense tufts of its original-looking branches, which, strange enough, are borne promiscuously upon the other normal branches. I think it needs age to produce these duplicate bloom characteristics. Hence, in answer to your correspondent, this is a somewhat common, or at least an acknowledged, *lusus naturæ* of a fixed character, seen upon aged trees of its kind.—*William Earley.*

Animal *v.* Vegetable Life.—Should no correspondent suggest any better aid in view of meeting "L.W." and his friend's views, I suggest that they place a peck of lime into as large a cask of water as he can obtain for it; to stir it up well, and subsequently, when the lime has settled down, to refill and repeat the process about three times. The second or third filling may be made from the tank itself. Even a portion of lime may be added to the water itself. In this wise fresh-water shrimps are frequently killed in watercress-beds without exhibiting the least injury as accruing to the plants which grow therein.—*William Earley.*

The Great Grey Trout, *Salmo ferox* (*lacustris*).—"We have to record," says the *Newark Herald*, "the capture in a salmon net of a very fine specimen of this fish, taken by Mr. Loscoe Bradley in the river Trent, at Cromwell, a village some six or eight miles below Newark-upon-Trent (Notts), on Monday last. When first taken it was imagined to be an ordinary but very fine salmon, of which, during the season, some good ones are occasionally captured in this district, and it was accordingly, on the following day, exhibited in the shop of our townsman, Mr. Kelly, fishmonger, Castlegate. Here it was seen by several, amongst whom were some experienced and devoted followers of the piscatorial art, one or two of whom seemed to be somewhat doubtful as to its belonging to the species for one of which it had been originally taken; and one gentleman in particular expressed a decided conviction that its characteristics were more those of the Great Grey Trout. After an examination this theory was generally accepted to be correct, the greatest mystery being as to how a fish generally supposed to be almost entirely confined to the larger lochs or lakes, should be found in this river. There is, however, a local tradition that some years ago a number of young fish of this species were turned into the river Derwent, which empties itself into the Trent, and it is thought possible that this may have been one of the number. The specimen here recorded was a male fish weighing 30 lb., very handsomely marked, well fed, and in splendid condition. Yarrell, in his description of the Great Grey Trout, in his work on British Fishes (1836), says that this fish was first noticed about eighty-four years previously, and quotes the following account from the seventh edition of the *Encyclopædia Britannica*:—'When in perfect season and full grown it is a very handsome fish, though the head is always too large and long to be in accordance with our ideas of perfect symmetry. In a trout the colours are deep purplish brown on the upper part, changing into reddish grey, and thence into fine orange-yellow on the breast and belly. The whole body, when the fish is newly caught, appears as if glazed over with a thin tint of rich lake-colour, which fades away as the fish dies, and so rapidly that the progressive changes of colour are easily perceived by an attentive eye. The lower parts of these fish are spotless, the dorsal fin is of the same colour with the upper part of the fish. It is marked with large dark spots;

the pectoral, ventral, and anal fins are of a rich yellowish-green colour, darker towards the extremities. The tail is remarkable for its breadth and consequent power. In adults it is perfectly square.'"

How to remove Beetles from Cardboard.—Would you be kind enough to inform me through the medium of Science-Gossip in what manner I could remove beetles, which have been fastened by coagulum, from cardboard, without injuring either the insect or the card? I should be greatly obliged by an answer to above.—*H. Wiglesworth.*

Cats and Frogs.—From the cool shelter of some tall weeds I turned out the other day a number of frogs. Upon a loud and prolonged squeak I looked up and found Puss, who had been quietly watching the operation, had seized one, and after the usual preliminaries he proceeded to devour it. I understand he is in the habit of doing this. Is it a common thing for cats to do?—*W. J. Horn.*

Sexes in Hermit-Crabs.—In answer to "G. G.'s" inquiry respecting the means of distinguishing the sexes in hermit-crabs, I extract the following from Bell's "History of the British Stalk-eyed Crustacea." The abdomen in the female of the common Hermit-crab, *Pagurus Bernhardus*, is furnished with four ovigerous false feet, each consisting of a basal joint, which is elongate and cylindrical, and two terminal laminar branches, the fourth much the smallest. In the male there are three false feet, composed of a basal and a double terminal joint, one finger of which is laminar and large, the other rudimentary. The terminal joint of the abdomen is notched.—*Thos. D. Russell.*

Arran Argus.—I took a female specimen of the Arran Argus in Margate last summer. Have any of your readers found this insect so far south before?—*W. J. Mercer.*

Tingis.—I shall be much obliged if any one who is familiar with the habits of the British Tingidæ will inform me when and where to collect them. I have searched thistles in vain, although from the name of Thistle-bug given to one species I should have expected some success.—*H.C.W.A.*

Local Plant-Names. — "Bazier" is the name given in some parts of Lancashire to the Auricula. It is, I am told, of very ancient origin, as an old song, called "A Swinton May-Song," proves. The Auricula came to us from the Continent, and the name signifies "little ear"; can bazier be a corruption of base-ear, sow, or little-ear?—*Helen E. Watney.*

Gram of India.—Can any reader of Science-Gossip give me the botanical name of this kind of pulse, which, I believe, is much used in India? It is a fabaceous plant, growing in a garden in Dorsetshire, about 1 ft. high, and bearing small thick pods containing two seeds about the size of peas. The recent wet weather has caused many of the pods to damp off.—*John E. Daniel.*

Our "Exchange" Column.—Allow me to protest against a practice which is creeping in amongst contributors to the "exchange" column of requesting a "stamped directed envelope" to be sent *in addition* to an object of interest. In the case of a gratuitous distribution, of course a stamped envelope should be sent, and besides, gratitude should be felt to the donor for his courtesy; but when an exchange is wanted, it is rather too much of a good thing for one of the parties to wish to throw all the expense on the other! Might I suggest that you refuse to insert exchanges with the objectionable condition referred to?—*C. P. G.*

Instinct of Ants. — My attention has been drawn to what appears to me to be an instance of the wonderful instinct of the Ant. The beds in my garden are edged with dwarf box about 9 inches in height, and correspondingly thick. Into this the ants have, in many instances, conveyed soil in sufficient quantities to form their abode. In one of these I found to-day numerous eggs. I am no entomologist, but it struck me that this proceeding was caused by the very wet season we have had, which has been quite sufficient, I should imagine, to drown out any of the ordinary nests.—*Geo. H. Payne.*

Frog Orchis.—Are there two varieties, or rather, is there a sub-species of *Habenaria viridis?* One form growing in the low ground here, near the sea, has been out of flower nearly six weeks, while the other is now in perfection on the hills near Goodwood and Harting. The perianth of the latter is tinged with a much deeper purple, and the spike is less lax. In Sowerby's plate two plants are represented, very dissimilar; are they supposed to give the two forms? For any conjecture on this point I shall be glad.—*F. H. Arnold, LL.B., Fishbourne, Chichester.*

How to preserve Mites.—Can any of your readers tell me how to preserve such common objects as *Acarus sacchari*, cheese-mites, &c.? They become destroyed by endosmose in a short time when fluid media are used, and granulate and lose all their detail when media that dry solid—at least all that I have tried—are used. Is there any cement that will confine alcohol in cells?—*E. G.*

"Call the Birds!"—A lady living in the neighbourhood of Birmingham is in the habit in cold weather of feeding the sparrows, and some years ago she taught her dog, a little black and tan terrier, to stand at the dining-room window and bark when she said to him, "Call the birds!" The sparrows got to understand the call, and would fly down to the window as soon as the dog began to bark. This morning (November 11th, 1874) being very cold and frosty, the lady thought it was time to begin feeding her feathered pensioners again, and made the remark, "I wonder will Trip remember his duty"; but the instant she began to prepare the plate of food, all doubt was set at rest, for he ran to the window to await his orders. We were pleased to see such an evidence of memory in the dog, and still more pleased and surprised when immediately the dog began to bark, before ever the window was open, about a dozen sparrows flew down, in eager expectation of their morning meal. In the summer months the birds are not fed. Is it not rather an unusual thing to find them remembering a custom of this sort from year to year?—*E. J. H.*

Aphis Migrations.—We are still in lack of reliable details as to the cause and extent of the migrations of aphides, which take place every summer, mostly in May and June, therefore I venture to put on record a modicum of information. On a June morning, following a calm night, and rather cool, a party of winged females arrived on a hazel-bush in my garden, about 6 ft. high, which had previously been free from them. To all appearance they came from the north, and concentrated themselves on the hazel, only a straggler or two being found beyond it, though there were other aphides in the garden that had bred there from winter eggs. The transit through the air had manifestly an aperient effect, for every leaf was coated with honey-dew in a few hours after the insects had landed, and I found that they also cast their skins. It was not long before their friends the ants and the hostile *Sylphi* discovered the new arrivals.—*J. R. S. C.*

Garden Ants.—Some town and country gardeners look with great disgust at the emergence in August of the males and females of the common black ant of our gardens, under the apprehension that they are in some way injurious to vegetation. There is also an equally groundless notion that these winged ants are apt to bite or puncture the human skin. That they do not usually return to the colony in which they have been nursed to maturity is evident, and yet only a small proportion of the females migrate to any distance. The male ants seem generally far more sluggish than their companions, and, so far as I have noticed, they exceed them in number considerably. The fussy attentions they receive from the workers as they leave the ant-hill are somewhat comical, and not much appreciated by the winged insects, which move about, as soon as their wings are expanded, in a bewildered fashion that renders them an easy prey to birds.

Enemies of the Gooseberry. — There are several species of insects which are very destructive to the Gooseberry. The *Abraxas grossulariata*, or Magpie Moth, deposits its eggs on the foliage, and from them is hatched, in September, a slightly hairy cream-coloured caterpillar, spotted with black, and marked with orange along the sides, and which forms a loop in walking. It feeds on the leaves in autumn and spring, devouring all but the petiole; and, after defoliating both gooseberry and currant bushes, it changes into a pupa in May or June, and in about three weeks afterwards the perfect insect makes its appearance. Hand-picking the caterpillars at an early stage of their growth, and, still better, burning the leaves on which the eggs are laid, are the troublesome means by which this destructive pest may be got rid of. Pouring over the bushes ammoniacal liquor diluted with water is stated by the late Mr. D. Beaton to be the easiest mode of destroying the caterpillars; but the strength of the liquor varies greatly; it is therefore advisable to ascertain, by experiment, the least amount of diluted liquor that may, without injury, be applied during sunshine to the leaves of some useless plant with tender foliage, and then add as much water as will insure the safety of the gooseberry leaves, without rendering the application too weak for the destruction of the insect. Another destructive insect is the caterpillar of *Phalæna vanaria*. It is about an inch in length, of a bluish-green colour, dotted with black tubercles, has ten legs, and, like the caterpillar of the Magpie Moth, forms a loop in walking. It changes into a pupa towards the latter end of May, and the perfect insect appears in the following month, or in July. Hand-picking, as soon as the larvæ are perceived, and dusting the bushes with hellebore powder, or with lime, are the means usually employed for its destruction; and, as the insect undergoes all its transformations on the ground, scattering newly-slaked lime around the bushes when the caterpillars quit is, perhaps, the best means of preventing the repetition of the mischief in the following year. The Gooseberry and Currant Saw-fly (*Nematus ribesii*) deposits its eggs on the under surface of the leaf, by the side of the principal nervures, early in spring, and successive broods of flies appear until October. The larvæ devour the leaves, leaving only the petiole; and, when fully grown, which is the case when they are about three-quarters of an inch in length, descend to the earth, spin a cocoon, and change into pupæ, from which another brood of flies soon emerges. Burning the leaves upon which the eggs are laid, and hand-picking where the plantation is not very extensive, syringing the bushes, and then dusting them with lime, which should also be scattered round the stems, and sprinkling the leaves with lime-water, are the remedies usually adopted. Removing early in spring the soil from round the bushes to the depth of 3 or 4 inches, and burying it in deep trenches, in order to entomb the pupæ, is a good preventive measure. Syringing the bushes in the evening, and sprinkling them with salt or soot, as well as flowers of sulphur applied with a sulphurator, are likewise said to be infallible remedies. In addition to the formidable enemies above enumerated, birds frequently prove very destructive, by picking out the buds in spring. The remedy which succeeds the best with me is, immediately after pruning to pass threads of white worsted, which need not be close together, a few times over the trees, winding them in and out of the branches. This effectually frightens the birds, who never attack trees so protected.—*M.* in "*The Garden.*"

EXCHANGES (*continued*).

For well-mounted Slide, Gold Ore Australia, send good Injection or large Insect, well-mounted. Many others for Slides, Books, &c.—W. Tylar, 165, Well-street, Birmingham.

For two living plants of *Stratiotes aloides* (Water Soldier), will give various other plants suitable for aquarium.—H. Tomlinson, East-street, Maidenhead, Berks.

British Plants wanted, *Hippophae rhamnoides* and *Frankenia levis* offered for *Arabis stricta* and *Polygonum maritimum* or others.—Address, G.B., 143, New Bond-street, W.

Cornish Plants offered, 253, 259, 290, 321, 343, 346, 923, 856, 1033, 1066, 1246, 1383, 1615, *Reseda suffruticosa* and *Milloletis parviflora*, London Catalogue, 7th edition.—Wm. Curnow, Pembroke Cottage, Newlyn Cliff, Penzance.

British Birds' Eggs for exchange.—G. Christopher Davies, 5, Alexandra-place, Newcastle-on-Tyne.

Rare Birds' Skins and Eggs for rare Eggs. No post cards; all letters answered.—J. T. T. Reed, Ryhope, Sunderland.

Diatoms, well mounted, for Diatom Slides, or any other objects of interest, or Diatomaceous Material. Lists exchanged. —R. K., 24, Victoria-place, Stirling.

BOOKS, &c. RECEIVED.

"Woodward's Manual of Conchology." New edition, with additional chapter by Professor Ralph Tate. London: Lockwood & Co.

"American Naturalist."

"Monthly Microscopical Journal."

"Les Mondes."

"Land and Water."

"Ben Brierley's Journal."

"Transactions of the Belfast Naturalists' Society."

Communications Received up to 10th ult. from:—G. H. K.—H. P. M.—W. E.—H. E. W.—H. G. W. A.—E. V. —T. D. R.—W. J. M.—W. J. H.—H. W.—W. A. C.—M. B. D. —A. B. K.—C. P. G.—G. R.—T. S.—I. H. K.—W. W.—E. G. —G. H. P.—W. K. W.—G. R. V.—A. J. R. S.—A. B.—J. P. —R. W.—J. R. S. C.—M. F.—J. C. T.—W. S. D.—J. T.—W. R. B.—A. F. M.—E. B.—R. H. N. B.—J. R.—W. F. B.—J. H. G.—H. E. W.—J. W. G.—F. E. F.—G. V. D.—E. F. J. —R. H. F.—S. C.—H. E. F.—C. F. G.—W. J. H.—D. J. P.—J. H.—R. S.—H. F.—W. E.—W. G. P.—G. S. B.—D. O. N.—H. F. E. W.—O. P. C.—W. F. H.—G. S. B.—J. G.—W. E.—H. A. M.—H. T.—W. C.—E. T. S.—H. H.—W. M. R.—W. T. —F. V. P.—G. B.—T. H.—J. B.—H. F.—J. F. D.—G. G.—C. D.—W. P.—C. A. O.—H. E. F.—H. J. T.—R. D.—A. C.—G. O. H.—W. H.—J. T.—J. T. T. R.—R. K.—M. A. M. K.—W. F.—G. N.—G. C. D.—&c. &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

H. A. M.—The objects sent go by the common name of "Sea-nuts," from their being brought by the gulf-stream to our southern shores. They are the seeds of *Mucuna pruriens*, one of the notorious "cow-itch" plants.

O. P. C.—The rough or warty Puff-ball is *Lycoperdon gemmutum*; the smooth specimen, *Lycoperdon pusillum*.

W. F. Henley.—The upright purple flowered plant is *Antirrhinum orontium*, the other is *Veronica arvensis*.

G. S. Barnes.—The plant marked A is the Yellow Balsam, or "Touch-me-not" (*Impatiens noli-me-tangere*), a native of Britain; that marked B is the Yellow Monkey-flower (*Mimulus luteus*), an escape from some garden, as it is a native of Chili.

H. Few (West Meon).—No. 1. You are probably correct—*Potentilla opaca*; it can only be an accidental introduction, doubtless with wool from S. Europe. No. 2. *Nigella Hispanica*, known by cottagers as "Devil-in-the-bush." We never heard the name "Moses" applied to it; it is an old, and frequently a favourite garden annual. No. 3. *Philadelphus coronarius*.

J. W. B. (Leicester).—The umbel you sent for our inspection is very unusual, and peculiar; not that the colour of the flowers is a distinguishing characteristic (when it reached us we could not perceive any difference in colour,—perhaps it had faded in drying). One of the umbellules is converted into a pinnate leaf; this will aid you in understanding a well-known natural law. *Vide* Masters' "Vegetable Teratology."

Osmunda.—The fronds you inclosed to us are, No. 1. A pretty variety of *Polystichum aculeatum* (Prickly Fern), closely resembling in outline the well-known, though very rare in Britain, "Holly Fern of the Alps." No. 2. Also *Polystichum aculeatum* by Hudson. Withering and many other botanists believed to be a distinct species, and accordingly name it *P. lobatum*. In Newman's "British Ferns" (page 111) you will find engraved several pretty forms of the Prickly Fern.

Sun-pictures (Glasgow).—No. 1. *Cystopteris fragilis*. Nos. 2 and 3. *Asplenium Adiantum-nigrum*. No. 4. *Lastrea dilatata*. No. 5. *Lastrea Filix-mas*, Male Fern. Nos. 6 and 7. Seeding fronds of *Lastrea Filix-mas*. Nos. 8 and 9. Do. do. No. 10. *Polypodium vulgare* (common Polypody). Nos. 11, 12, and 13. Small seedling specimens of the Male Fern. The pictures are very beautiful. The best book, as a guide to our native ferns, is Moore's "Handbook of British Ferns": it contains excellent engravings of every species, it is also very cheap.

J. W. B (Sparkbrook).—You are correct; the species is a Ranunculus (*R. bulbosus*). It is in a bad state for identification;—could you send another, a dried specimen? It is certainly not *R. auricomus* (Goldilocks).

F. H. A. (Fishbourne).—The inclosure is, we believe, a hybrid; we have seen one, but with white petals, very similar, however, in other respects. We should advise you to send specimens to Dr. Syme.

B. M. O. (Hastings).—No. 1. *Juncus acutiflorus*; 2. *Sclerochloa rigida*; 3. *Juncus glaucus*; 4. *Juncus bufonius*.

J. P. H. B. (Jersey).—Yes: *Sisymbrium Iris*: we think the inflorescence is very dense.

R. K.—Your slides are, Nos. 1 to 4. *Navicula rhomboides* and *N. crassinervia*; 5. "Secondary plate" of *Heliopelta Metii*; 6. *Aulacodiscus crux*, Ehr. in *Microgéologie*; 7. Fragment of *Aulacodiscus Sollittianus*, Norman, in *Q. M. J.*, and *Eupodiscus Rogersii*, Kutzug, in *Spec. Alg.*; 8. *Triceratum favus* (1 valve) and *T. condecorum*, Kut., *Sp. Alg.*, and Brightwell, in *Q. M. J.*, vol. iii.; 9. *T. megastomam*, Brightwell, in *Q. M. J.*, vol. iii.; 10 contains the same; 11. *Navicula* (=*Pinnularia*) *radiosa*. The deposit mentioned in No. 12 probably arises from the medium used; mastic is not soluble in turpentine.

EXCHANGES.

Wanted, mounted *Arachnoidiscus*; will give mounted scales of *Lepisma*, *Battledore*, or *Podurea*. I can give any number of the insect *Lepisma*. Lists exchanged.—Address, Murray Fowler, 20, Burn-row, Slamannan, N.B.

Pure gatherings prepared of *Fragilaria capucinia* and *Diatoma elongatum*, for other good Diatomaceous Material or Slides.—John Redmayne, Surgeon, Bolton, Lancashire.

Tertiary Fossils from any strata, for *Permian*, *Rhætic*, *Devonian*, or other *Palæozoic* forms.—A. Bell, 20, Little Earl-street, Soho, London.

Chrysitis, *Fuliginosa*, *Velleda*, *Aglaia*, *Artaxerxes*, *Alsus*, *Semele*, and Pupæ of *Carpini*, for other Insects.—R. Hay Fenton, 48, Gordon-street, Aberdeen.

Entomology:—*Colias edusa*, *Colias hyale*, *Leucophasia sinapsis*, *Doritis Apollo*. Good specimens of the above will be given for *Sphinx pinastri*, *Deilephila galii*, *Deilephila livornica*, or some of the Clear-wings.—Address, E. F. Johns, Winton House, Winchester.

I have the following Lepidoptera for other or Birds' Eggs:—*Sinapis sibylla*, *W'Album fuciformis*, *Dominula*, *Roboraria*, *Orion*, *sponsa*, *promissa*, &c.—Wm. Watkins, 25, Rutland-street, Hampstead-road, London.

Eggs of *L. dispar*, and Larvæ of *D. gonostigma*, *D. folatoria*, *U. sambucala*, &c., for Lepidoptera, British Birds' Eggs, and Shells.—W. K. Mann, Granby House, Granby-hill, Clifton, Bristol.

Wanted, Mounted Algæ for other Algæ Mounted, and Foraminifera or Diatomaceæ mounted, for Mounted Carboniferous Foraminifera.—Send lists to G. R. V., 187, Dunlop-street, Carbrook, Sheffield.

Six Slabs of Polish Madrepore, rare sorts; six Minerals, ditto; or twelve British Shells, ditto; for a few second-class specimens of Dudley Trilobites.—Send stamped envelope to A. J. R. Sclater, 9, Bank-street, Teignmouth.

Lathyrus maritimus, *Crepis fœtida*, and *Orobanche picridis*, for Nos. 106, 243, 290, 401, 472, 623, 710, 1046, 1126, 1233, 1274, 1296, 1416, 1597, 7th edition, Lond. Cat.—A. B., 107, High-street, Croydon.

Eggs of Curlew, Common Sandpiper, Kingfisher, Dipper, Red Grouse, Crow, Ray's Wagtail, Kestrel, Sparrowhawk, and others, for other good Eggs.—R. Standen, Goosnargh, Preston, Lancashire.

Seeds of the *Erinus Alpinus*, a pretty wall or rock plant, magenta-coloured flower, for any Fossils, except mountain limestone. This is perhaps the only locality for it in England.—Rev. W. S., Downham Parsonage, Clitheroe.

Bupleurum tenuissimum, *Salicornia radicans*, *Suoeda fruticosa*, *Frankenia levis*, for other good plants.—W. G. Piper, care of F. Sutton, F.C.S., Norwich.

For the beautiful *Æcidium saniculæ*, send stamped directed envelope to John Turner, Davenport, Stockport.

Fifty species of New Zealand Shells, for like number of British Shells. Specimens to be named.—M. V. Hodge, Wanganui, N.Z.

Obisium trombidioides, for other Chelifers, alive or well mounted.—C. F. George, The Grove, Kirton Lindsey.

Eggs of Dabchick, Partridge, Sand Martin, Swallow, Black-cap, Sedge Warbler, Meadow-pipit, &c., for Sea-bird's Eggs preferred.—H. E. Forrest, 13, High-street, Shrewsbury.

Duplicates: Pupæ of *P. machaon* and Imagos of *L. dispar*, *A. adippe*, *A. selene*, *T. quercus*, *P. ægon*, and *F. pinaria*; Desiderata: *T. betulæ*, *G. C. album*, *M. fuciformis*, *A. cratægi*, *C. plantaginis*, or offers.—D. J. Preston, Riversfield, Catton, near Norwich.

Wanted, 772, 731, 749, 768, 726, for 7, 159, 325, 572, 587, 594, 666, 1040, 1128, 1138, 1440, 1459, Lon. Cat. 7th edition.—J. Henderson, Cranleigh, Guildford.

Good specimens of *H. semele*, *G. rhamni*, *C. cardui*, *M. morme*, *L. quercus*, *O. vaccinii*, also of *Molytes coronatus*, for British Lepidoptera.—G. S. Barnes, Grove House, Weybridge.

Wanted at once six or ten ounces of unprepared Foraminiferous Soundings, Dredgings, or other good material preferably recent, for pure Foraminifera or two Slides.—J. Green, March.

Wanted a few Bulbs of *Crocus sativus* and *Colchicum autumnale*; good exchange given.—H. Higginson, New Ferry, Cheshire.

Fossil Earths from Holland Cliff, Richmond, and New Nottingham, U.S., for those from Monmouth, U.S., and Moron, Spain.—Address, R. Battersby, Caragh Lake, P.C., Killarney.

Draba rupestris, *Gentiana nivalis*, and other rare plants from Scotland, for South of England rare Plants.—L. Tetlow, 19, Radcliffe-street, Oldham.

Duplicates: *Nupta*, *pyramidea*, *maura*, *typica*, *ianthina*, *megacophala*, *impara*, *pallens*, *dispar*, and *quercus*.—W. Harper, Norfolk Park Cottage, Maidenhead.

For exchange, Nos. 131, 179, 284c, 318, 338, 405, 576, 637, 668, 704, 873b, 984.—C. A. Oakeshott, 19, Eardley-crescent, South Kensington.

Cluster-Cups on Primrose and Gooseberry, Alexanders, small Bugloss and Coltsfoot summer Violet with aborted petals, Spiracle and Tracheal Tubes from larvæ of Goat-moth, a few Slides of the fang and poison-gland of viper, all mounted, for good Slides. Send list.—G. Garrett, Harland House, Wherstead-road, Ipswich.

Correspondence and exchange wanted in Birds' Eggs with American, Colonial, and Continental collectors, by C. Dixon, 60, Albert-road, Heeley, near Sheffield.

Eggs of the Quail, C. Snipe, and Ring Ousel, one side hole, for those of the Swift, Dipper, Nightingale, or other rare Eggs.—William Petch, Heeley, Sheffield.

Mounted Bladders of *Utricularia* (see Darwin's "Insectivorous Plants"), for other Slides.—J. B., 224, West George-street, Glasgow.

A plant of *Vallisneria* sent for good mounted or unmounted Micro. Object.—J. H., 101, Mill-street, Macclesfield.

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XIII.—ASPARAGUS.

THIS delicious vegetable is supposed to have come into use as food about two hundred years before the Christian era; its excellent qualities are said to have been made known by that most distinguished and ancient writer on agriculture, the elder Cato; he has treated no subject with greater care, the last chapter of his work being devoted to this vegetable. It appears to have been known to the ancients as growing wild, under the name of *Corruda*. Cato advises the sowing of the seed of this plant in the beds of the vine-dressers' reeds, which are cultivated in Italy for the support of the vines; and that they should be burnt in the spring of the third year, as the ashes would act as a manure to the future crop. He also recommends that the plants be renewed after eight or nine years. Athenæus, who wrote about the third century, tells us that this plant was divided into two varieties, the Mountain and the Marsh; and that in some parts of Libya they attained the thickness of a Cyprian reed, and were several feet in height; he also informs us that the plant was used as a remedy in all diseases. But Diphilus, a physician who lived about the same time, and the author of a work, "On Diet fit for Persons in Good and Bad Health," declares that asparagus was very hurtful to the sight. Pliny states that asparagus, which formerly grew wild, so that every man might gather it, was in his time carefully cherished in gardens, particularly at Ravenna, where the cultivated plant was so large that three heads would weigh a pound, and were sold for an as (about three farthings); but according to Martial, those grown at Ravenna were no better than the wild.

The Roman cooks used to choose the finest heads of this vegetable, and dry them; and when wanted for the table put them into hot water and let them boil quickly for a few minutes: hence the proverb, "Citius quam asparagi coquentur"—(Do it quicker than you can cook asparagus),—when anything was required in haste. Suetonius informs us in his Life of Augustus that this was a favourite expression of that emperor, when he wished that any affair might be concluded without delay. Pliny states that the uncultivated kinds grew upon the mountains in different countries, and that the plains of Upper Germany are full of it. Juvenal, in a description of a dinner given to a friend, mentions the mountain asparagus:—

> "Asparagus besides
> Picked by my bailiff's plain but cleanly bride,
> Who, when the wheel's domestic task is o'er,
> Culls from the hills my vegetable store."

It was believed by the ancients that if a person anointed himself with a liniment made of asparagus and oil, the bees would not approach or sting him. They also had another absurd idea, that pounded rams' horns buried in the ground would produce this vegetable.

We cannot trace the cultivation of asparagus in England; it is evidently indigenous to the country, for Gerard states that the manured or garden asparagus, which comes up of the size of the largest swan's quill, is the same as the wild, but, like other vegetables, made larger by cultivation. The wild, he says, is "found in Essex, in a meadow adjoining a mill beyond a village called Thorpe, and also at Singleton, not far from Curbie, and in the meadows about Moulton, in Lincolnshire; likewise it groweth in great plenty near unto Harwich." The same author informs us that in Queen Elizabeth's time it was sodden in flesh-broth, or boiled in fair water and seasoned with oil, vinegar, salt, and pepper, then served at men's tables for a salad. Evelyn, in his "Acetaria" (1699), says, "that next to flesh nothing is so nourishing as asparagus; it was sometimes eaten raw with oil and vinegar, but was more delicate if speedily boiled, so as not to lose its colour." He tells us that he did not think the large Dutch kind, "which was raised in highly manured beds, so sweet and agreeable as those of moderate size, and yet to show what solum, cœlum, and industry will effect, the honourable and learned Charles Hatton made my wife a present of 16 sparagus, the whole bundle containing only sixty, weight 15 lb. and ¼. So allowing 4 oz. to each sparagus, one was as much as one would desire to eat, and what was most observable, they were not raised or forced by any extraordinary compost, but grown in a more natural, sweet, rich, and well-cultivated soil about Battersea." Miller, in his "Dictionary," states that a friend of his procured some seed of the wild kind, which he cultivated with great care in very rich ground, yet could not get the roots to produce a stem more than half the size of the garden kind which grew on the same bed, but he always found the wild sort come up ten days or a week earlier in the spring, and that the shoots were exceedingly sweet. Leonard Meager, in his "English Gardener," published in 1683, informs us, that in his time the London market was well supplied with forced asparagus; the means employed were by placing the roots on warm manure-beds. Battersea, Mortlake, and Deptford used to be the principal localities from which the metropolis was supplied; Mortlake alone, at one time, had more than a hundred acres under this crop, and a Mr. Grayson, of that place, once produced a hundred heads that weighed 42 lb. There are accounts of some very large heads of this vegetable being produced on some parts of the Continent; thus, we read in Keysler's "Travels," that at Darmstadt, in 1730, some large asparagus was grown, the heads of some weighed half a pound; some hundreds of these heads were sent as a present to the Elector Palatine.

The asparagus trade in France is becoming of more importance every year. The principal place of its culture near Paris is Argenteuil, from which place in 1820 about five thousand bundles were sent to the market, but now the produce probably exceeds a million. It is grown to a very great size, the maximum attained at the present time being 8 in. in circumference; but a dish of such grass costs 40 to 50 francs. In the south of France this vegetable is frequently grown between the vines. There was an asparagus-growing company started at Brunswick in 1869; several hundred acres are devoted to the cultivation of this vegetable, and it bids fair to rival that of Argenteuil. This vegetable might be cultivated in England with great success, in soils consisting of little else than sea-sand, dressed annually with seaweed, on many spots on the coast, that will hardly produce any other vegetable. A few years since a very large variety was introduced from America, under the name of Conover's colossal asparagus.

The wild asparagus is found in many parts of Europe where the soil is light and containing an amount of salt, which appears to be necessary for this plant. The salt steppes of Russia, Mr. Loudon tells us, are covered with it, and horses and oxen eat it like grass. In England it is found growing in Cornwall, Mullion Island, near Lizard's Point, Kyname Cove, called Asparagus Island; also on the western and south-western coast. Among the various virtues attributed to this plant is one given by Antonie Mizold, in the seventh century, who states that if the root is put on a tooth that aches violently, it causes it to come out without pain. The sprouts contain a peculiar crystalline substance, called asparagine, which was formerly used in medicine, but is not now retained in the Pharmacopœia. Sometimes a decoction of the root is given as a diuretic in dropsies.

Loudon states that the flower-stalks of *Ornithogalum* are used in some parts of Gloucestershire, and sold in Bath under the name of Prussian asparagus; also the stalks of "salsify." The mid-rib of the beet is sometimes dressed as this vegetable; and the young buds of the hop are said to be scarcely inferior in taste. The tender shoots of the Typha, a kind of reed, are eaten by the Cossacks like asparagus. Under the general name of asparagus the ancients were accustomed to class all young sprouts of vegetables which were used in that state. The word is almost literally Greek, signifying a young shoot before it unfolds its leaves, as handed down to us by Dioscorides. Gerard gives nearly the same definition, but in English, he states, it is called "sperage." Parkinson says our old English writers "called asparagus 'sperage'; when these names were vilely corrupted into '*sparrow*-grass,' and thence frittered down into 'grass,' I am unable to say" (Parkinson, "Paradisus"). Batty Langley ("Principles of Gardening," published 1728) says, "the top of the bud is of the form of a sparrow's bill, and from thence vulgarly called 'sparrow-grass,'" In Low Dutch it is called "coralcrunt," or *Herba Coralli;* coral-wort, in respect to its red berries, the seeds of which have been recommended as a substitute for coffee. The young plants grown in pots make most beautiful decorations for the room or dining-tables.

HAMPDEN G. GLASSPOOLE.

PROTOPLASM.—"Protoplasm seems to bear to life the same relation that a conductor does to the electric current."—*Dr. Nicholson's Introduction to Zoology.*

THE GREENSAND AND ITS ORIGIN.

"* * * but whether it was mechanical abrasion or chemical solution that removed the foraminiferal shells, whose internal casts formed the greensand deposit of the Cretaceous epoch, must remain for the present an open question."—Dr. Carpenter "On the Nature of the Sea-bottom procured by H.M.S. *Challenger*." (*Ann. and Mag. of Nat. Hist.*, vol. xv., No. 88, April, 1875.)

THE author of the paper from which the above is extracted proceeds on an assumption which I have met with repeatedly, and which is based on an oft-quoted statement made by the venerable Ehrenberg in 1853, to the effect that the grains of Greensand are for the most part, if not entirely, internal casts of Foraminifera in mineral glauconite. Dr. Carpenter has no hesitation in accepting this statement as proved, and, as shown above, with no qualification whatever, nor, as far as appears, with any attempt at verification; thus giving the weight of his name to the assumption that Greensand is a rock made up of casts of Foraminifera. Now as it is not a fact that greensands of the Cretaceous epoch are always composed of foraminiferal casts, it is time that the statement of Ehrenberg, indorsed so unreservedly by Carpenter, should be challenged. Living in a district where the Greensand is well developed, I long since unsuccessfully attempted to discover the internal casts of which I was told it was composed. As far as Ireland is concerned this is not so. Foraminifera to the number of over 100 species abound in the overlying chalk, the specimens being most beautiful and perfect; but only one species recorded from the Greensand, which, however, is not a cast, but a calcareous shell. This itself is almost conclusive against the assumption that the glauconite grains are casts, as we can hardly suppose that amongst millions of shells none would escape destruction. Further, shells of Foraminifera do occur in the Cambridge Greensand, not mere casts, but perfect calcareous tests, having all the characteristic surface-ornamenation, and without any infilling of glauconite. The occurrence of these shells in the English Greensand does away with the notion that there was something in the waters of the Greensand seas that was destructive of calcareous shells. Dr. Carpenter also forgets that the Greensand yields us molluscan fossils in abundance, and that not in the condition of casts, but having their calcareous tests preserved, and showing the finest striæ uncorroded. I have already stated that I was unable to find any foraminiferal casts in our Greensand, but, as my less-practised eye might err, I requested my friend, Mr. Joseph Wright, F.G.S., to examine the material with the microscope, which he kindly consented to do, portions of the Irish Greensand, and also Greensand from Cambridge, passing under his scrutiny. I have every confidence in Mr. Wright's judgment and acuteness, he having detected in the chalk rocks of Antrim, Down, and Derry, in the course of three years over which his examinations have extended, more than 120 species of Foraminifera and Ostracoda, in addition to sponge spicula and Bryozoa,* being about one-half the number examined by Ehrenberg himself from cretaceous rocks during a long series of years. Mr. Wright was equally unsuccessful as myself; the rounded angular grains are in most cases too large, and present no real resemblances to the many well-marked forms of Foraminifera.

The assumption that the Greensand is formed of casts of Foraminifera should be rejected for the following reasons:—

1st. Foraminiferal shells do occur plentifully and uninjured in the English Greensand; *ergo* there is no cause for assuming the wholesale destruction of calcareous shells in that epoch.

2nd. Calcareous tests of mollusca have remained; casts are rare in the Greensand.

3rd, and conclusive. The grains of glauconite in the Irish Greensand, when examined under the microscope, show no real resemblance to Foraminifera.

Whilst, for what seem good and sufficient reasons, coming to the conclusion above stated, I do not mean to assert that Ehrenberg stated anything but what was correct as regards the material he examined. Doubtless what he saw seemed to bear out his assertion; but hasty generalizations are the greatest fault of our times, and it is to be deprecated that erroneous statements should go forth under the sanction of high authorities in the scientific world. When one finds that Dr. Carpenter makes a false assumption in a matter that comes under our own observation, it is hard to avoid thinking that he may be equally in error regarding such a hazy question as Eozoon *versus* the mineral ophite. If any reader of SCIENCE-GOSSIP wishes to examine the subject for himself, I will be happy to send him some of our Greensand for that purpose.

Belfast. S. A. STEWART.

ABNORMAL FORM OF MALE FLOWER OF VEGETABLE MARROW.

THE tendency cultivation has to cause a development of the sexual organs of plants into floral leaves is well known, but the following case of a plant apparently so little prone to mutation as the Vegetable Marrow may not be without interest. The male flower of this plant consists of a monosepalous calyx with five clefts, and contains a single stamen, at the base of which are *usually* three openings into the nectary, over which the filament forms a sort of vault.

* *Vide* "Annual Report and Proceedings of the Belfast Naturalists' Field Club, 1873-74."

On September 9th, my attention was attracted by what at first appeared to be a pistilliferous flower without an inferior germen; but on examination it was found to be a staminiferous flower with a peculiar growth, in fact, under process of becoming "double."

Fig. 149. Hermaphrodite flower of Vegetable Marrow.

The flower as it appeared is shown in fig. 149, which gives the parts *in situ: a*, is the anther; *c*, a growth emanating from the suture at the bottom of the cleft, and which was several times reflected on itself, exhibiting a tendency to become

Fig. 150.

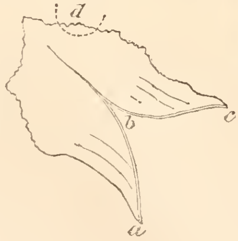


Fig. 151.

separated; *d*, another growth, which was almost completely severed from the wall of the calyx, being joined thereto only by a production of the epidermis, as shown in fig. 150, at *c; a b* (fig. 150), is the cut wall of the calyx; *d*, a green appendage, one time taken for the calyx: a reflection of the edge is shown at *e*. This growth, when opened out so as to be perfectly flat—for which purpose a slit was made up the posterior ridge running from *b* to *c* (fig. 150)—presented the appearance shown in fig. 151, which is a front view, *a b c* being the slit; at *d* was a small portion (inclosed by the dotted line) which to the naked eye appeared as if covered with some viscid fluid, similar to that found on stigmata; but on examination with a low magnifying power, it appeared as fig. 152, and the apparent fluid was

Fig. 152.

shown to be simply pollen-granules; their presence there in such number and in so limited a space being caused by contact with the anther while growing. Hairs were very scarce and small, and were only revealed on microscopical examination:

two hairs from the interior of the calyx are shown in the bottom of the field of view, for comparison.

The calyx having been carefully removed, the third growth (*b*, fig. 149) was found to be adherent to the stamen, as shown in fig. 153; its shape was that of a pointed reniform leaf, the petiole being applied to the filament, and the line of junction easily seen; but no such line of demarcation could be distinguished between the anther and the leaf, the structure of the one merging insensibly into that of the other. This leaf was also reflected on itself at various points, and was of a much deeper colour than any other part of the flower, in fact, it was of quite an orange-colour.

Fig. 153.

It is also noticeable that while the anther bore plenty of pollen, the nectary at the base of the filament was totally obliterated, so that the usual inducement for insects to effect fertilization was not offered. There were no indications of any abnormal growths at the other two sutures of the flower. RICHARD C. BAIGENT.

SPAWN OF FROGS AND TOADS.

YOUR correspondent G. M. Doe, in SCIENCE-GOSSIP for September, 1875, asks what is the difference between the spawn of frogs and toads, and whether eggs arranged in single strings are toad's spawn?

Some years ago I reared both frogs and toads from the egg to the perfect animal, and on referring to drawings taken at the time, find that toad's spawn is figured in *strings*, and frog's in *lumps*. I remember seeing large masses of the latter lying in a shallow pond near Bristol on March 1st, 1862, and plunging my hand into the bitter cold water, found it difficult to drag out a small enough quantity to put into the narrow neck of a pickle-bottle provided for the purpose, because, as I tried to grasp at the smooth transparent conglomeration of clear eggs, with little black spots in the middle of each, like currants in jelly, the slippery mass quietly evaded my hold, slid heavily back into the water, and stirred up the mud. So firmly were these apparently impalpable clusters of spawn (say from 4 to 12 inches in diameter) glued as it were to themselves and to each other by the gelatinous covering that surrounds each embryo, that the lumps seem heavier to the touch than to sight.

With toad's spawn it is different; this has to be more carefully looked for, being much smaller, and very likely, as your correspondent says, "in single strings." My drawing gives a string of spawn containing a double row of eggs. It is 2 inches long, lying over the stem of a piece of hornwort, and was found in a deeper pond near Bridport. Each white egg is only about the eighth of an inch in diameter; the black spots in the middle are smaller and darker than the frog's, as also are the tadpoles. Toads' eggs are sometimes half an inch in diameter. Unfortunately I have not kept dates of the different stages of development (as I now should, and would recommend all observers to do the same), and therefore do not know how long a time transpires, after the egg is laid, until the young tadpole is hatched. Probably this and all stages of development depend greatly upon light and temperature. Once I kept a tadpole a whole year before it turned into a frog. The spawn is usually to be found in March.

In England we have two toads and one frog,—the common frog (*Rana temporaria*), the common toad (*Bufo vulgaris*), and the aristocratic toad or natterjack (*B. calamita*). I have reared only common toads and frogs. Nothing is more interesting than to watch the metamorphoses during the larval state. In both species the young can be watched through the transparent egg, which is very small when laid, but afterwards swells, and is largely composed of water. The speck of a tadpole in the centre gradually enlarges into a round black ball; soon the tail uncurls, the head eats its way through the gelatinous covering, and the tadpole is free, appearing with a fringe or tuft of external gills on either side of the head, and remaining generally on or near the eggs until these are eaten up. In a few days they seek other food, the external gills disappear, the animal breathes by internal gills or branchia adapted for breathing air dissolved in water, and swims actively through the water by means of a fish-like tail: at the base of this a pair of legs are eventually seen budding. When these are fully developed, the front limbs spring from behind the head, the tail becomes gradually absorbed, the animal breathes by lungs, and hops out of the water a perfect frog or toad, as the case might be, breathing atmospheric air. The tails do not really *drop off*, according to popular belief: if they do, why has no man ever seen them? It would be waste of material; in nature nothing is wasted. The tadpoles' tails are *absorbed*, not *lost*. I have watched them gradually growing shorter, and have a drawing showing this stage; but I doubt if any one ever *saw* them drop off or cast their tails. Yet so widespread is this popular delusion, that even at the late Microscopical Soirée of the British Association at Bristol, learned members, showing the circulation in frogs' feet aud tadpoles' gills and tails, were patiently propagating the favourite fact. When asked to prove it, the answer was, "Every one knows it." Wheu asked, had any one ever *seen* the tails drop off? the only answer was a surprised look of incredulity, as if the interrogator had gone mad. How this odd superstitiou arose and became so widely disseminated by word of mouth and iu print, is hard to say.

This instance again shows how little we kuow even of our commonest aquatic animals, and how much remains to be learnt. Aquarium science, yet in its infancy, will add important links to our knowledge, especially in the study of embryology. But in the case of toads and frogs, a large public aquarium, with constant circulation of water, is not uecessary. Any one with a little common seuse and patience can keep tadpoles. It would be extremely iuteresting to get a careful set of observations, with locality, names, dates, and drawings of the comparative developmeut from embryo to adult of the common frog (*Rana temporaria*), the two toads (*Bufo vulgaris* and *B. calamita*), and also our water salamanders, tritons, lizards, or newts (*Triton aquaticus* and *T. cristatus*). I should be glad to know who is considered the best authority on this subject, and if a series of correct drawings exist. Also I want to know if toad tadpoles ever possess external gills? My drawings do not represeut any; in other respects they resemble the frogs: both tadpoles live from about March to August. I have never hatched-out water-lizard tadpoles, but have drawings of four taken Sept. 20, 1860, representing them of different sizes and stages, from half an inch long, with four legs and external gills, to 1¼ inch, with four legs, a tail, and no external gills; that is, exactly like the adult, but not fully grown. I saw a specimen as large as this, showing the beautiful circulation of the blood through the external gills, last month, at the British Association soirée, Aug. 26. Thus, it appears, as if these young water-lizards are of different ages, and therefore the eggs must be laid at different times. Is this so? J. G. Wood says that the water-lizards (*Triton*) lay their eggs separately; each single egg is deposited on some water-plaut, and that then the leaf is cleverly twisted up so as to protect and conceal it. H. A. Nicholson, in his "Manual of Zoology," distinguishes between the order *Urodela*, or tailed amphibians, such as water salamanders or tritons, and the *Anoura*, or tail-less amphibians, as frogs and toads, by saying that "the development of the newts is like that of the frogs, with two points of difference. 1st, that the embryonic tail is not cast off in the adult; and 2nd, that the fore limbs are developed sooner than the hind limbs, the reverse being the case in the *Anoura*." The water salamanders, or newts, are furnished with a compressed fish-like tail, and are strictly oviparous (that is, the young are hatched from eggs). The larvæ are tadpole-like in form, with external branchiæ, which they retain till about the third month. The adult is destitute of gills, and breathes by lungs alone, but the larval tail is retained throughout the life of the animal. The land salamanders form the genus *Salamandra*, and are distinguished from their aquatic brethren by having a cylindrical instead of a compressed tail, aud by bringing forth their young alive, or by being ovo-viparous. The water newts and all the *Urodela* are ofteu completely lizard-like in form when adult, but they always possess gills in the earlier stages of their existence, and this distinguishes them from all the true lizards (*Lacertilia*). These are related to the giant extinct *Saurians*.

Thus we have in the frog an animal furnished with three sets of breathing apparatus, four legs, and a tail at different stages of its existence. 1st, external gills as a tadpole; 2ud, iuternal gills like a fish; 3rd, lungs adapted for breathing air. The gills and tail, no longer needed for aquatic existence, are absorbed, not lost; the animal steps out of the water a true lung-breathing vertebrate. Next come the Tritons, with external gills for three months iustead of three days; lungs appear, and the four legs and tail are retained throughout life. The animal is amphibious, living mostly in the water, but dies for want of breath if kept there, and prevented from coming to the surface to breathe. Next below comes a curious animal, the American Axolotl (*Siredon pisciformis*), shining like a huge black tadpole 12 or 14 inches long, with four legs, a tail, and a set of external gills, which are retained throughout the whole of its existence. For some time it was supposed to be merely the tadpole, or larval form of some terrestrial animal, but I believe it is uever knowu to leave the water voluutarily, and breeds freely iu this condition, laying quantities of eggs, which are easily reared. Strange to say, although it never breathes by anything but gills, it has *rudimentary lungs*. This tendency to variation, and shadowing forth of higher forms, side by side with persistent types, is intensely interestiug, as forming links iu Darwin's endless chain of evolution.

G. S.

THE "WEARING" OF LEPIDOPTERA.

It is a fact which must have been noticed by all collectors of Lepidoptera, that there is a remarkable tendency in some species speedily to become worn and torn. As a notable instance of this I may mention the graceful *Limenitis Sibylla*. For several years my brother has taken large numbers of this butterfly, by far the greater portion having the wings more or less clipped. This was not owing to the length of time they had been out, as the colours were quite fresh and bright. The showier *Atalanta* is rarely found in this damaged condition. With *Hyperanthus* the case is different; this insect does not get torn, but soon becomes faded. *Cassiope* and *Medea* are still more delicate. And amongst moths, *Epunda lutulenta* almost directly after emergence adorns itself with notches in its wings, so that specimens—and I have taken many—are very difficult to obtain in good order. Who, too, cannot speak from experience of the manner in which the handsome *Catocalidæ* disfigure themselves? *Geometers*, as a rule, wear well; doubtless owing to their extreme lightness; though there are exceptions, as *Scotosia dubitata*, &c. The question arises, why this difference as to the "wearing" of various species? As is well known, the wings are formed by a transparent membrane covered with what are termed scales, arranged somewhat like the tiles on a roof; each having a little stalk which fits into a socket in the membrane. It is said that there is no colouring matter in these scales, but that the colours are produced by the interference and decomposition of light. It follows, then, that the faded appearance cannot be due to any destruction or alteration of colouring matter, as that of the chlorophyll in plants, but must be caused entirely by the loss of the scales; that in some species the scales are attached very slightly, and thus being easily removed, the insect soon looks shabby. *Amphipiyra pyramidea* and the beautiful *Xanthia* genus are examples of Lepidoptera with the scales but slightly connected. Contrast these with *Aprilina* and *Meticulosa*. Whilst the Sallows will scarcely bear a touch without injury, the last-named may be handled even roughly and not receive any appreciable damage.

With those species which, like *Sibylla*, *Iris*, and *Lutulenta*, are so often caught with little pieces out of their wings, it seems to me we must attribute as the cause thereof the peculiar brittleness of the alar membrane itself.

Joseph Anderson, Jun.

SKETCHES IN THE WEST OF IRELAND.

No. 9. Aran Islands.

(*Post-Christian Antiquities—continued.*)

By G. H. Kinahan, M.R.I.A.

In connection with the old churches, especially in Western Ireland, are peculiar stone basins called bullâns. These seem to be more or less peculiar to that country; if not, elsewhere they are commonly passed over unnoticed. The Irish bullâns may be classed, as shallow or dish-shaped, and deep or bowl-shaped. Some of the first are large oval dishes, and seem to be pre-Christian, as they have only been found in the interior of the De Danaan tuiams or carns. The accompanying cut, taken from a sketch (fig. 154) given me by the late G. V. du Noyers, M.R.I.A., represents the bullân in the large carn at Slieve-na-Caillighe, county Meath. These large bullâns are oval; and similar-shaped ones, but much smaller, occur in, or in the vicinity of, some of these older churches of the West; while in South-east Ireland an intermediate type—round shallow bullâns—have been remarked; one occurring at Bannow, county Wexford; while at Donaghmore, in the same county, there is a peculiar, probably uniquely carved bullân. It was cut in a small block of micasyte, was twelve inches in diameter and about three inches deep, its interior being sculptured after a six-cornered cross. It is now broken, and a small portion of it gone, but fig. 155 represents what it originally was.

The second, or bowl-shaped bullâns, are typically Irish. They are generally from twelve to sixteen inches in diameter and from six to ten inches deep, the depth being more than half the diameter. A few are much smaller, about the size of a teacup. Usually they are single, but in places two, three, and, in one instance, five have been recorded as occurring together in one block of stone. In general, a very hard stone has been selected by the stone-cutter; thus, in the county Galway they have been scooped out in granite or sandstone erratics. Of those we have seen, only four were in limestone, one of which is a blessed well, hereafter to be mentioned, on Aranmore; two, forming wells, which seem to be modern, occur together at Lisdoonvarna, county Clare; while the fourth was lately pointed out by Mr. Fitzgerald, of Holy Cross, Lough Gur, county Limerick. All these bullâns are cut in the solid rock, but the latter, which lies a little south-east of the historical Lough Gur, is also remarkable for its unique shape, being an inverted cone nineteen inches deep and twelve or thirteen inches in diameter (fig. 156).

This class of bullân in general occurs in the vicinity of churches, but not always. In the valley north of Adrigole, Bantry Bay, a so-called holy well, is a bullân that was cut in the horizontal stone of a cromleac, while on the hill north-west of the same village is a second bullân cut in a block of stone, that seems also to have been a portion of a cromleac; and in the hills north-east of Tulla, county Clare, a bullân cut in the solid rock (sandstone) was observed. None of these places seem to be at all connected with ancient ecclesiastical establishments.

What were the bullâns? It has been suggested that the bullâns in the carns were corn-crushers, such structures having been built not as burial-places but as prisons. This, however, seems highly improbable, as the structures evidently were intended as tombs, and as the dish-shaped bullâns seem to be a necessary appendage to the large carns, it appears probable they were connected in some way with the ancient funeral rites. The small, shallow bullâns, as far as we are aware, are always found in or close to churches, and were evidently used either as baptismal fonts, or for holding water for washing purposes. Some are nearly rectangular in shape, while between the small dish-shaped bullân to the stalked or pedestal font of the present day, there are regular gradations.

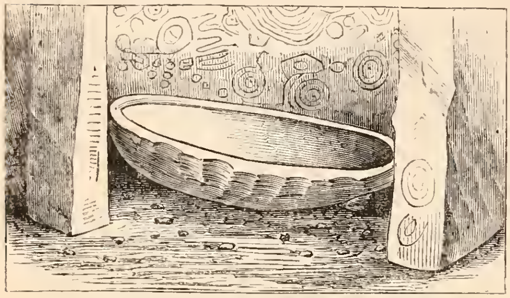


Fig. 154. Dish-shaped bullân in Cist of the Chamber of the larger Carn, Slieve-na-caillighe.

Many, if not nearly all, the bowl-shaped bullâns may have been used as baptismal fonts, but some were undoubtedly used as corn-crushers. This has been proved by Dr. W. King, of Galway. At Roscapne Round tower, near Galway, are two stones, one containing three bullâns and the other two; and

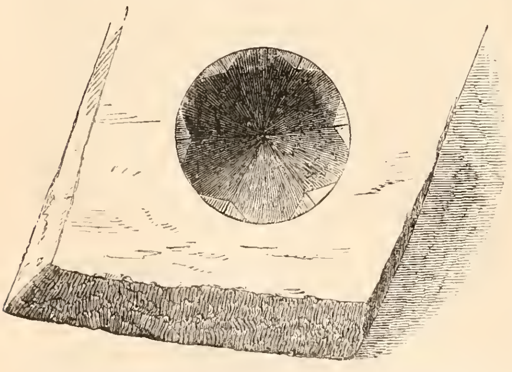


Fig. 155. Sculptured bullân (restored), Donaghmore Church, co. Wexford, 1 ft. diameter, and nearly 3 in. deep.

King, after considerable research, found in an old wall in the vicinity, an oval quern that exactly fitted the deeper bullân in the two-holed stone, while the smaller hole in the same stone seems to have been made to rest the quern in while the crushed corn was being removed. This also seems probable in some of the other double-holed stones, although in no other place has the upper stone or quern been found. This may not, however, have been the case with all double-holed bullâns, as in some cases the holes are of nearly equal depths and of different shapes. Near Killgoola, west of the lower portion of Lough Corrib, are a pair of small bullâns cut in the solid rock, of nearly equal size, and called Gluine Phaudrick (*Anglicè*, Patrick's Knees), as the saint is said to have worn them praying. Their original use seems very obscure. The word bullân properly means any *conical substance*, or a *circular excavation;* thus water-worn holes in rocks are called bullâns, also a cow's teats; both from their shape and aperture. In olden times baptismal fonts, from

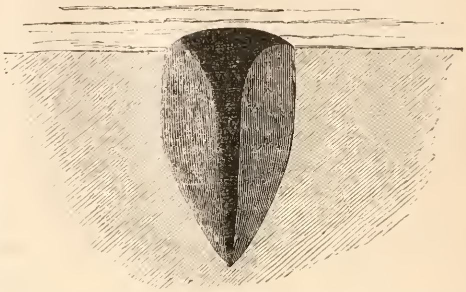


Fig. 156. Section of the Bullân near Lough Gur, co. Limerick.

being circular excavations in stones, may have been so called, but they are called in modern Irish Umarbaisdidh, or baptismal troughs. To us it would seem probable that the bullâns at the churches may have been put to more than one use, sometimes being used as fonts, at other times as corn-crushers, or even for grinding up the herbs, &c., used for the distillation of the drinks of the period. The latter suggestion would specially refer to the five-holed bullân, called Leac-na-poul, or the holed flag, at Cong (fig. 157), as it was in the vicinity of a large abbey, a place where probably there was a large consumption. Those also in such localities as the mountains near Adrigole, Tulla, &c., may have been used for bruising the heather for the manufacture of the ale about which we hear. Unfortunately the process is now unknown; but that the heather was once valuable seems probable, as otherwise we would not find the remains of the walls and fences dividing up the wild heathery mountains into small lots.

From bullâns we naturally go to the holy wells, as many of the former are thus designated. These wells are dedicated to different saints, although probably they were a pagan custom that was engrafted on to the Christian religion. At various times the priests of the different forms of Christianity have tried to do away with them, but without success, and at the present day they are much venerated and visited. Without doubt they are efficient in some diseases, such as sore eyes; this, however, is just as probably due to the regular washing of the eyes as to the holy water; but in some cases the waters seem to have medical properties. Some holy wells are natural, others artificial holes in a rock that are said never to go dry;

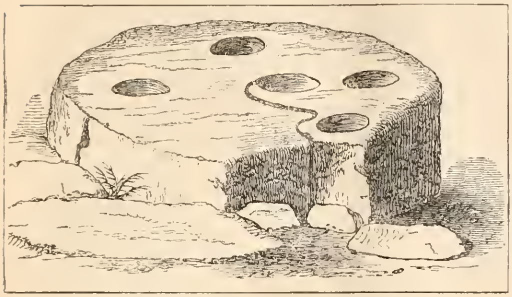


Fig. 157. Leac-na-Poule, co. Mayo.

others are springs. The latter may have a small structure built around or over them, while others are left in their natural state. Usually there is a tree or bush in their vicinity, and sometimes a cross. The latter generally has been moved from

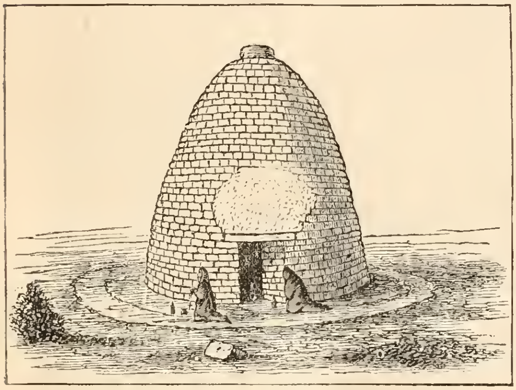


Fig. 158. Tober mickle, Dungeagan, Ballinskilligs, co. Kerry.

some adjacent burial-ground, but sometimes it has been erected by a devotee. The accompanying sketch is of a unique holy well near Ballinskilligs, county Kerry (fig. 158). The structure over the well would be very like some of the small round cloghans if its height were less or its diameter greater. It is called Tober mickle or St. Michael's Well.

THE RESTING SPORES OF THE POTATO FUNGUS.

By Worthington G. Smith, F.L.S.

[We take the first opportunity of laying before our readers the following important paper, by Mr. Worthington Smith, from the *Monthly Microscopical Journal* for September.—Ed. *S.G.*]

THE potato disease in this country is rarely seen before the month of July, but this year I received some infected leaves for examination from the editors of the *Journal of Horticulture* at the beginning of June, and my reply to the correspondent was printed on June 10th. The leaves were badly diseased, and I detected the Peronospora in very small quantities here and there, emerging from the breathing pores. This was a week or ten days before Mr. Berkeley brought the matter before the Scientific Committee of the Royal Horticultural Society; and when I heard Mr. Berkeley's remarks about the Protomyces, I immediately accused myself of great carelessness in possibly overlooking it; but I was equally certain of the presence of the Peronospora in the specimens I examined.

On receiving authentic specimens of diseased plants from Mr. Barron, of Chiswick, the brown spots on the potato leaves at once reminded me of the figures of some species of Protomyces, and the dimensions agreed tolerably well with some described plants of that genus; but the spots, when seen under a high power, appeared very unlike any fungus, and they were very sparingly mixed with other bodies much smaller in diameter, and with a greater external resemblance to true fungus spores. These latter spore-like bodies were of two sizes—one transparent and of exactly the same size as the cells of the leaf (and therefore very easily overlooked), and the other darker, possibly reticulated, and smaller. A few mycelial threads might be seen winding amongst the cellular tissue, and these threads led me to the conclusion that the thickened and discoloured spots on the leaves were caused by the corrosive action of the mycelium, in the same way as peach, almond, walnut, and other leaves are thickened, blistered, and discoloured by the spawn of the Ascomyces, as illustrated at the last meeting of the Royal Horticultural Society.

My opinion, therefore, was soon formed that the "new" potato disease (as it has been called) was no other than the old enemy in disguise, or, in other words, that it was the old *Peronospora infestans* in an unusual and excited condition. That climatic conditions had thrown the growth of this fungus forward and out of season was probable; but the idea that the pest would not at length attack all and every sort of potato was to me most unreasonable, though the more tender sorts might be the first to suffer.

Suspecting the two-sized small bodies before mentioned to be of the nature of spores, and remembering my experiments during last autumn with ketchup, in which I observed that the spores of the common mushroom might be boiled several times, and for lengthened periods, without their collapsing or bursting, I thought I would try to set free the presumed spores in the potato leaves by macerating the foliage, stems, and tubers in cold water. This maceration was necessary because the tissue of the diseased leaves was so opaque and corroded, and the cell-walls were so thickened, that it was difficult to distinguish the threads and suspected spores from the cellular tissue. I did not treat the leaves with boiling water because I wished to keep the threads and spores alive.

From day to day I kept the diseased leaves, stems, and tubers wet between pieces of very wet calico, in plates under glass, and I immediately noticed that the continued moisture greatly excited the growth of the mycelial threads; this to me was quite unexpected, as I had merely wished to set the spore-like bodies free. So rapid was now the growth of this mycelium, that after a week had elapsed, some decayed parts of the lamina of the leaf were traversed in every direction by the spawn. Thinking the close observation of this mycelium in the now thoroughly rotten and decomposed leaves might end in some addition to our knowledge of *Peronospora infestans*, to which fungus I had no doubt from the beginning that the threads belonged, I kept it under close observation, and in about ten days the mycelium produced a tolerably abundant crop, especially in the diseased tubers of the two-sized bodies I had previously seen and measured in the fresh leaves. The reason why these objects, which undoubtedly occur in and about the spots, are so extremely few in number in those positions is, I imagine, because they require a different set of conditions for their normal growth, and these conditions are found in abundant and continued moisture.

The larger of these bodies I am disposed to consider the "oogonium" of the potato fungus, and the smaller bodies I look upon as the "antheridia" of the same fungus, which are often terminal in position. The filaments of the latter are commonly septate, and sometimes more or less moniliform or necklace-like. Both oogonium and antheridium are very similar in nature and size to those described as belonging to *Peronospora alsinearum* and *P. umbelliferarum;* and this is another reason (beyond my seeing undoubted *P. infestans* on potato leaves at the beginning of June) why I am disposed to look upon these bodies as the oogonium and antheridium of the potato fungus.

The larger bodies are at first transparent, thin, pale brown, furnished with a thick, dark, outer wall, and filled with granules; at length a number (usually three) of vacuities or nuclei appear. The smaller bodies are darker in colour, and the external coat is apparently marked with a few reticulations, possibly owing to the collapse of the outer wall. I have observed the two bodies in contact in several instances. After fertilization has taken place, the outer coat of the oospore enlarges, and soon gets accidentally washed off in water. Both antheridium and oogonium are so slightly articulated to the threads on which they are borne that they are detached by the slightest touch, but with a little care it is not really difficult to see both bodies *in situ;* and my observations lead me to think that conjugation frequently takes place after both organs are quite free. The antheridia and oogonia are best seen in the wettest and most thoroughly decomposed portions of the tissue of the decomposing tuber, but they occur also in both the stem and leaf. I consider Mr. Alexander Dean's remark, as reported in the *Gardeners' Chronicle* for June 19th last, p. 795, to have a distinct bearing on this point, where he says, "In all cases where the seed tubers were cut they were quite rotten."

Before I referred to De Bary's measurements of similar organs in other species of Peronospora, I was disappointed with the results of my observations, and felt disposed to refer the bodies and threads in the potato leaves to Saprolegnia; but a glance at the figures now published and the similar figures copied from De Bary to the same scale, will show that if the bodies observed by me are Saprolegnia-like, the oogonia and antheridia figured by De Bary show an exactly similar alliance. Still, as the Saprolegnieæ are at present defined, I am by no means inclined to describe the bodies observed by me as *really belonging to that tribe of plants.*

The Saprolegnieæ have the habit of moulds and the fructification of algæ, and they live on organic matter, animal and vegetable, in a state of putrefaction in water. One of the best known of these plants is *Botrytis Bassiana*, the parasite which causes the disease of silkworms. Now the genus Botrytis among fungi is almost or quite the same with Peronospora, to which the potato disease belongs; and I consider it a strong argument in favour of my Saprolegnia-like bodies being the oogonia and antheridia of the Peronospora when such an authority as Mr. Berkeley considers one of the Saprolegnieæ (Achlya) "may be an aquatic form of *Botrytis Bassiana*"—the silkworm disease.

The common fungus which attacks flies (so frequently seen on our window-panes in autumn), *Sporendonema muscæ*, Fr., is said to be a terrestrial condition of *Saprolegnia ferax*, Kutz., which latter only grows in water; and if a fly infected with the fungus be submerged, the growth of the Saprolegnia is the result. It would now seem to be somewhat the same with the potato when diseased, in the fact that when submerged a second form of fruit is produced.

Between the two moulds, Botrytis and Peronospora, there is little or no difference; the characters of Corda, founded upon the continuous or septate filaments, cannot be relied upon, and even De Bary himself figures *P. infestans* with septate filaments, like a true Botrytis. The intimate connection, however, between the Saprolegnieæ and some moulds cannot be denied, as the instances above cited clearly show; and I am therefore disposed to think that the fungus which produces the potato disease is aquatic in one stage of its existence, and in that stage the resting spores are formed.

Reference may here be made to the bodies found germinating in the intercellular passages of spent potatoes by Dr. Montagne (Artotrogus), and referred by Mr. Berkeley to the Sepedoniei. Ever since Mr. Berkeley first saw these bodies he has had an unswerving faith in the probability of their being the secondary form of fruit of *Peronospora infestans*, but unfortunately, as far as I know, no one has ever found a specimen of Artotrogus since Montagne.

The question may, therefore, be naturally asked,—How does Artotrogus agree with the presumed resting spores here figured and described? And has Mr. Berkeley been right or wrong in clinging so tenaciously to his first idea? Fortunately for the investigation of the potato disease (which can never be cured till it is understood), Mr. Berkeley has given in the *Journal of the Royal Horticultural Society* the number of diameters his figures are magnified to, and I have here engraved those figures so as to correspond in scale with my own drawings, which latter are sketched with a camera lucida. It will be seen that they are the same with each other both in size and habit, with the exception of the processes on the mature spore of Artotrogus—which processes may possibly be mere mycelial threads, or due to the collapsing of the inflated epispore. The reason why these resting spores have evaded previous search is that no one has thought of finding them amongst leaves which had been macerated for a long period in water. There is, however, nothing unreasonable in fruit being perfected in water or very damp places, as it is common in the Saprolegnieæ and amongst Algæ in general. To sum up, there are four reasons why the bodies here described belong to the old potato disease:—

1. Because they are found associated with the Peronospora and upon the potato plant itself.

2. Because they agree in size and character with the known resting spores of other species of Peronospora.

3. Because some other moulds are aquatic in one stage of their existence.

4. Because they agree in size with Artotrogus.

Now that these drawings illustrative of the fungus which causes the potato murrain are reproduced in the following plates, it may be as well to explain at once some of the terms used and the nature and habit of the bodies hereafter referred to, for such readers as may not be thoroughly acquainted with the life history of the destructive parasitic moulds to which the potato fungus belongs. For that purpose reference must be made to fig. 159, which shows (greatly enlarged) a transverse section through the leaf of a potato plant; the two great bodies at A A represent two minute hairs on the leaf, and at B B are seen the individual cells of which the leaf is constructed. When these hairs and cells are compared with the fine thread at C, which represents a branch of the potato fungus coming out of a breathing pore of the leaf, it will be seen how very minute the fungus is in comparison with the dimensions of the leaf. This fine thread is no other than a continuation of a thread of spawn or mycelium which lives inside and at the expense of the assimilated material of the leaf. When this thread emerges into the air, as here shown, it speedily ramifies in different directions, and bears fruit at the tips of the branches, as at D D; these fruits are termed simple spores, or conidia, because from their smallness they are dust-like. It is quite possible they may be an early state of the vesicles which contain the zoospores, as seen at E, F. However this may be, they are commonly arrested in growth when still small, and they germinate in an exactly similar manner with the zoospores themselves, and may be considered somewhat analogous with seeds. The potato fungus has another method of reproducing itself in the "swarm-spores" shown at E, F. These are so called because, on the application of moisture (as supplied by dew or rain, or when applied artificially), the vesicles set free a swarm of from six to fifteen or sixteen other bodies known as "zoospores," so named because they are furnished with two lash-like tails, and are capable of moving rapidly about like animalcules. This rapid movement usually lasts for about half an hour, and (like the dust-like conidia or "simple spores" before mentioned) the swarm-spores generally enter the breathing pores of the leaf, and there germinate. So potent, however, are the contents of these bodies when set free, that they are capable of at once corroding, boring, and entering the epidermis of the leaf, or even the stem or tuber itself. These zoospores are best seen when within the vesicle F, where they arise from a differentiation of the contents, but when once set free (G) they are, from the extreme rapidity of their movements, very difficult to make out. In about half an hour they cease to move, their lash-like tails (cilia) disappear, and having burst at one end, a transparent tube is protruded, which is a similar mycelium in every respect with that produced by the simple spore, and which grows, branches, and fruits in a precisely similar manner.

Now the great difficulty which has beset botanists for so many years has been to account for the winter life of the potato fungus. Simple spores and zoospores are lost in the production of the mycelium or spawn, and this latter fine thread-like material cannot of course survive the frosts and rains of winter, but must utterly perish with the perished leaves and haulm.

A study of other species of Peronospora allied to the one which produces the potato disease, reveals the fact of a third mode of reproduction. Simple spores and zoospores are termed asexual, because they are without sex, as distinguished from other bodies called oospores, which are produced by the contact of two sexual spore - like bodies, known as the antheridium, which is the male, and analogous with the anther, H, and the oogonium, the female, and analogous with the ovary of a flower, J. The oospores, not till now seen for certain in the potato disease, are the true resting spores. Instead of being transparent and unenduring, as are the simple and zoospores, these bodies are at length dense in substance, black-brown in colour, and covered externally with reticulations or warts. They are produced from the mycelium, by the contact of the antheridium and oogonium in the substance of the decaying plant; they are washed into the earth, and there they rest till a certain set of conditions makes them germinate in the year following their production, just as a seed falls and rests in the autumn and starts again into life during the following spring.

The terms here used will be better understood if the following note is borne in mind: The oogonium is analogous with a pod, the oosphere within answers to the ovule, and the oospore (or resting spore) is the matured seed. The antheridium with its contents is analogous with the anther and its pollen.

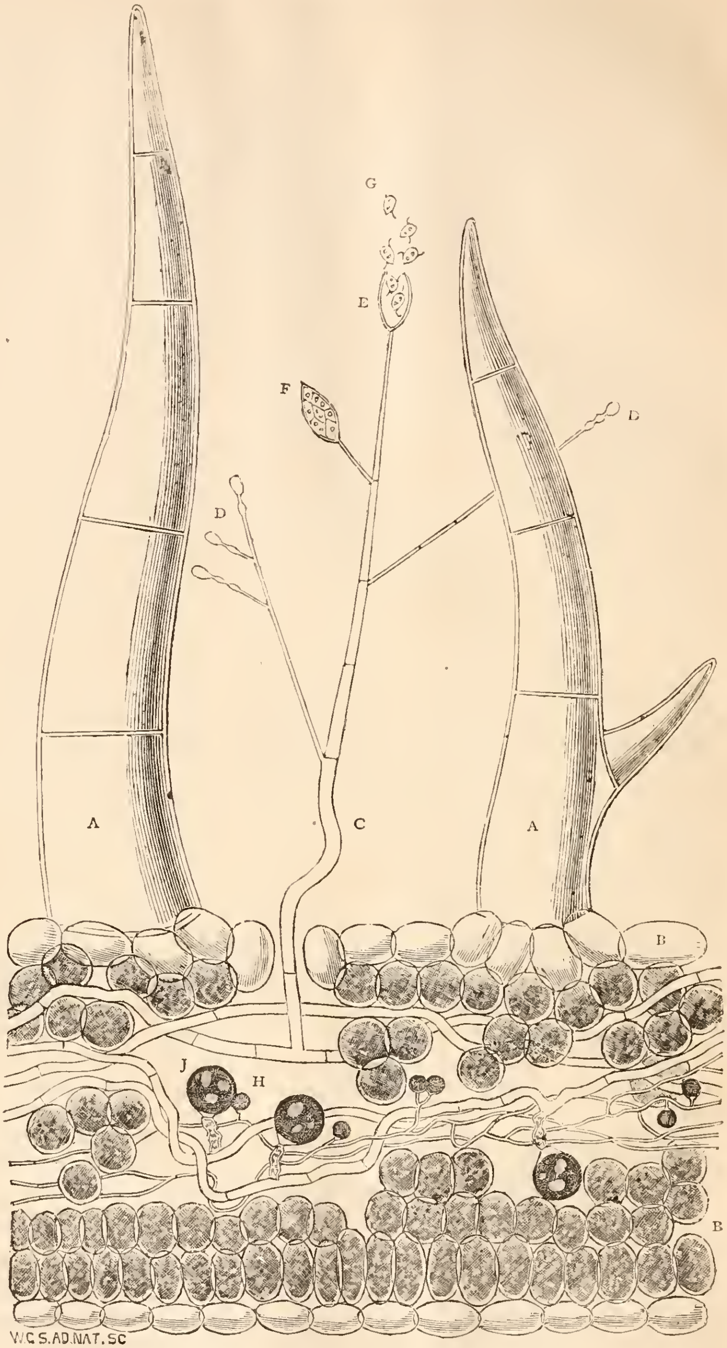


Fig. 159. Transverse Section of a Fragment of Potato Leaf with *Peronospora infestans*. Enlarged 250 diameters.

In various other fungi nearly allied to the potato fungus these resting spores have been seen, measured, and illustrated, but till now the resting spore of the potato fungus has eluded all search. The reason generally given and accepted for its absence

Fig. 160. *Peronospora alsinearum.* Oogonia and Antheridia enlarged 400 diameters.

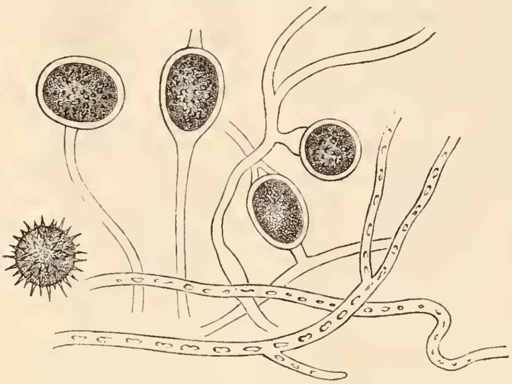


Fig. 161. The Artotrogus of Montagne and Berkeley. Enlarged 400 diameters.

Fig. 162. *Peronospora umbelliferarum.* Oogonia and Antheridia, enlarged 400 diameters.

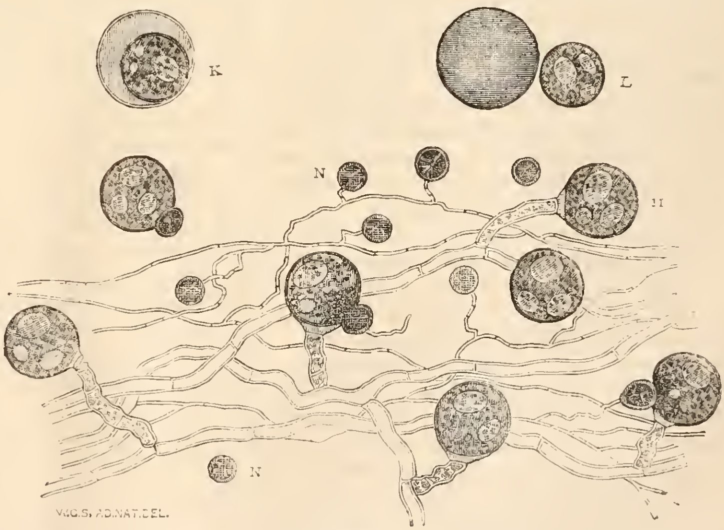


Fig. 163. *Peronospora infestans.* Oogonia and Antheridia from badly diseased leaves of Potato, after a week's maceration in water; enlarged 400 diameters. Antheridium $\frac{1}{2500}$ = ·0004 inch. Oogonium $\frac{1}{1000}$ = ·001 inch. Coat of Cellulose $\frac{1}{700}$ = ·00142 inch.

is, that the potato is not the plant on which the fungus luxuriates to the greatest extent, and that if we only knew the plant it most affects (probably some South American species of Solanum) we should then find plenty of resting spores easily enough; for it must not be forgotten that the potato fungus is by no means confined to the potato. It grown on various species of Solanum besides *Solanum tuberosum;* it is even not unfrequent on the woody nightshade of our hedges, and it grows upon the tomato and other solanaceous plants, together with at least one plant which belongs to quite a different natural order. On these latter, however, it makes less headway than upon the potato. As an instance in point, the allied pest of the garden lettuce may be mentioned—*Peronospora gangliformis* — first described by Mr. Berkeley. Here, if the resting spores of the parasite are wanted, they must not be sought for in the lettuce itself, where they are only sparingly produced, but in a plant belonging to the same natural order also commonly afflicted with the same parasite, viz. the common groundsel: the resting spores are said to be even more common in sow-thistles than lettuces.

Therefore, although it is probable we shall have yet to look to some other member of the natural order Solanaceæ to find the resting spores in any abundance, yet, as the resting spores of the lettuce mould can by searching be found in the lettuce itself, so the resting spores of the potato fungus have without doubt been found this year in the potato plant.

How this came about is now pretty generally known. Mr. Murray exhibited some specimens of potato leaves badly diseased, before the Scientific Committee of the Royal Horticultural Society. In the corroded spots of these leaves Mr. Berkeley's sharp eye detected dark-brown warted bodies (but no mycelium), which he referred to the genus Protomyces. Assuming these bodies to be the true resting spores, which they doubtlessly are, they were necessarily free, as the coat of cellulose disengages them from the mycelial threads. But some similarly spotted leaves had been previously sent on to me from the *Journal of Horticulture*, upou which I detected the old potato fungus, mycelial threads within the leaves, aud some circular transparent bodies of two sizes, new to me.

In attempting to wash the circular bodies out of the leaves and stems, by maceration in water, I fouud the moisture greatly accelerated the growth of the mycelium, and that the long-sought-for oogonium and antheridium were at length the result. These bodies were at first most sparingly produced, so that for many days, and after most careful searching, I could only find one or two. Afterwards I found them more abundantly in different stages of maturity, especially in the very putrid stems and in the tubers when in the last stage of decomposition. Mr. Berkeley afterwards found them with abundant mycelium, after the meeting of the Royal Horticultural Society, on July 7, where he exhibited a drawing of one restiug spore still attached to its thread. Mr. Broome (from material sent by me) has also detected and sketched, together with the immature spherical bodies, one of these brown, coarsely-marked resting spores, but it was so involved in the mycelial threads (so he writes me) that he could not set it free. It is quite possible that the condition of the potato, as seen duriug the present season, is quite exceptional, and that it may not occur again for a loug series of years. Mr. Broome has written me to say he has never seen anything similar in diseased potatoes.

In the preceding illustration, which is an exact copy of the first sketch taken, the oogonia and antheridia are seen in the substance of the lamiua of the leaf, the two bodies being in contact at H J. In fig. 163 many more of the same bodies are shown; some in actual contact. The two upper figures, K and L, show the resting spores some time after fertilization, when a coat of cellulose is the result. In K the spore is surrounded by this coat, whilst at L the spore is accidentally washed out by maceration in water. The semi-mature resting spores, as shown in these figures at M M, are furnished with a dark coat or skin; this coat, when further maturity is reached, clearly resolves itself into two layers, the inner one beiug termed the endospore, and the outer, which in *Peronospora infestans* is almost black iu colour and warted, the exospore. The latter resembles in outward aspect, instead of oue spore, a dense concreted mass of minute brown-black bodies. The antheridia are shown at N N. The perfected resting spores are slightly egg-shaped, and on an average are one-thousandth of an inch in diameter. The oosphere is fertilized by the coutact of the antheridium; when the two bodies accidentally touch, the latter fixes a small branch or tube, called a pollinodium or fecundating tube, into the wall of the oogonium, and discharges part of its contents into the protoplasm of the infant resting spore. When these resting spores are mature, the mycelial threads soon vanish, and the spores are free.

When I read my first notes before the Royal Horticultural Society, I had not been able to detect this fecuudating tube, but since then I have several times seen it. After the potato plant has been badly attacked and destroyed by the fungus, every part of the plant and its parasite perishes, except the dark-brown warted resting spores just described, and these find their way into the earth and hibernate. When they awake to renewed life in the summer, they must germinate in the damp earth, and if no potato plants are near, they perish, as the earth cannot support them. In this they are not unlike the seeds of germinating Dodder; for if they caunot fiud a proper host they die. But if potato plants happen to be uear the corrosive mycelium, it at once penetrates and enters the tuber or haulm. The tuber cannot produce simple or zoospores if buried, but in the haulms the mycelium doubtless soon grows and produces both these forms of fruit. These are at once carried by the air into the breathing pores, and the whole history of the fungus here described is re-enacted.

Siuce my observations ou these bodies were published in the *Gardeners' Chronicle* for July 10, I have (by the courtesy of the Rev. M. J. Berkeley) had an opportunity of carefully examining and measuriug the original specimens of Dr. Montagne's artotrogus, found long ago in the iutercellular passages of spent potatoes, and from the first considered to be the secoudary form of fruit of the Peronospora by Mr. Berkeley. I have no hesitation whatever in saying that the bodies lately seen, and now figured by me are positively the same with Dr. Montague's in every respect, aud when reflected and traced with the aid of a camera lucida no difference whatever cau be detected. The bodies seen in Dr. Montagne's specimens are, without doubt, the fertilized and half-mature resting spores, and therefore dense, uncollapsed, and exactly the same in size, habit, and colour with mine when in the same stage of growth. After the lapse of so many years the threads, as might be expected, have more or less perished, but it is not difficult to find traces of antheridia in the specimens.

For comparison, the original figure of artotrogus (fig. 161) is here exactly reproduced to the same scale as my drawings, from vol. i. of the *Journal of the Royal Horticultural Society*, to show the similar nature of the bodies illustrated. Since this was engraved, Mr. Berkeley has kindly forwarded Dr. Montagne's original drawings to me for examination, and I may as well say they contain many more threads and oogonia than are shown in this cut, and they are also more like my organisms now brought forward. As for some of the bodies being shown as if within the threads by Dr. Montagne, I consider this of little moment, as the oogonia are at times almost or quite sessile, and consequently, when seen in some positions, they put on an appearance of being within the mycelium, whilst in reality they are upon or under it. As for the echinulate body at o, described as a "mature spore," it is not exactly like Dr. Montagne's original drawing, which is shown as furnished with a thick wall, and there are no "mature" spores in his specimens. After a most careful and searching examination of the latter, I can find no such bodies, but there are several spores on the two mica slides which put on a *spuriously* echinulate appearance, which is owing to the collapse of the coat of cellulose, as suggested by me as a possibility when I read my first paper.

It will be observed there is a little difference in size between my oogonia (fig. 163) and those copied from the *Journal of the Royal Horticultural Society;* this is because the figures in the latter are somewhat incorrect. When the *actual specimens* are examined and measured side, by side they are in every way identical.

Mr. Berkeley has also most obligingly sent me a specimen of another (new species?) of Artotrogus, found in decayed turnip by Mr. Broome in 1849. Here the threads and semi-mature bodies are in the same style as the oogonia and threads from the potato, and the mature spore is not truly echinulate; it is globular, with a slight tendency to an oval shape, and is covered with warts. It is probably the resting spore of *Peronospora parasitica*, the pest of the cabbage.

In figs. 162 and 160 are given copies of the oogonium and antheridium of *Peronospora umbelliferarum* and *P. alsinearum*, enlarged from De Bary to the same scale as the other figures, to show the close similarity in size and habit.

(*To be continued.*)

"The Swallows, loth to leave us, linger on far into the autumn, and only bid us adieu when they miss the genial influence of the sun's rays, and can no longer find a sufficient supply of food."—*Harting's Summer Migrants.*

MICROSCOPY.

Seeds as Opaque Objects for the Microscope.—"F. E. Fletcher" and others will find the following seeds good microscopic objects for low powers:—*Portulaca oleracea, Silene pendula, Loasa aurantiaca, Paulonia imperialis, Lychnis floscuculi, Antirrhinum majus, Eschscholtzia termiflora, Stellaria media, Galinsoga parviflora, Nemesia compacta, Hypericum pulchrum, Sphenogyne speciosa.** Glycerine is, perhaps, one of the most troublesome media to keep within the bounds of the cell; but the following cement will, if properly applied, do so. Gold-size, white-lead, red-lead, and litharge; it must be made thin enough to work freely with the brush. This cement should only be made in sufficient quantity for present use, as it soon hardens and becomes useless. Care must always be taken to cleanse the slide and cover of any glycerine that may have escaped: the cement should be used in successive layers, allowing the first to harden before applying a second. I am informed that the flake white (mixed with oil) sold in tubes for the use of artists, to which a little dammar varnish should be added, is also an excellent cement.—*F. K.*

Seeds for the Microscope.—The following small seeds will prove interesting objects under a low power and good reflected light:—*Digitalis purpurea, Antirrhinum majus, A. orontium, Linaria cymbalaria, L. purpurea, L. vulgaris, L. minor, L. spuria*, and the seeds of *Scrophulariaceæ* generally. The Bignoniaceæ are interesting, on account of the varying development of a beautiful winged appendage — e. g. *Paulonia imperialis, Eccremocarpus scabra, Nemesia versicolor, Lophospermum scandens*, &c. The Ranunculaceæ furnish many beautiful specimens; as, *Nigella damascena, Cimicifuga racemosa.* The Papaveraceæ are also interesting, as also the genus Campanulæ, and the whole of the Caryophyllaceæ. There is plenty of opportunity for research, as only a hundred or two of minute seeds, so far as the writer knows, have been examined.—*W. T. S.*

Glycerine Mounting.—Glycerine is difficult to keep in a cell, but it can be done effectually by careful manipulation. The proper cement is the solution of shellac in wood naphtha, known as "liquid glue" or "patent knotting varnish." The object being placed in its cell, and the cover put in position, the surplus glycerine is to be carefully cleared off, so as not to disturb the cover; first, by absorbing as much as possible by the delicate application of shreds of blotting-paper with the forceps, afterwards clean off as much glycerine as possible with a

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* "One Thousand Objects for the Microscope," by M. C. Cooke, gives figures and descriptions of many kinds of seeds and pollens.

wet camel-hair pencil; then carefully varnish by hand, not on the turntable, for fear of disturbing the cover, running the varnish into the angle formed by the junction of the cover and cell, and including the smallest possible portion of both cover and cell; next day, when the varnish is dry, place the preparation under a stream of water, either a tap turned gently on, or the wash-bottle, to wash away the whole of the glycerine from the surface of cell and cover, as until this is done effectually the varnish will not adhere and make a good joint, hence the reason of covering the smallest possible space with the first coat of varnish. Dry carefully, and then revarnish. The turntable can now be used: if there is any doubt about the removal of surplus glycerine, wash again. Repeat the varnishing until a good amount is accumulated, not neglecting the junction of the cell and slide. As the shellac varnish becomes somewhat brittle after a time, give a few coats of gold-size for further security; gold-size is the most reliable of varnishes, and stands well so long as contact with the almost universal solvent glycerine is prevented. The system of compound varnishing is useful in many other cases where the varnish used in retaining the fluid is not altogether reliable.—*W. T. S.*

Mounting Mites.—For mites try castor; it succeeds well with some insects. Place the insects in a bottle of the oil, and leave until required for mounting; the longer the better. Liquid glue is the proper cement, followed with gold-size (see reply to "F. E. Fletcher," on "Glycerine Mounting"); very great care is required in cleaning off the surplus oil from the cell and cover; it is best done with a camel-hair pencil moistened with benzole. Unless every trace of grease is removed, do not expect the varnish to hold. Weak alcohol can be kept in with gold-size. For strong alcohol try gelatine, followed by gold-size; respecting this the writer has no experience.

Cleaning Diatoms.—The following quotations from "The Microscope and its Revelations" will doubtless supply "St. T. H." with the information he requires. After describing the treatment of the diatomaceous deposit with acids, Dr. Carpenter goes on to say (5th edition, p. 344):—"The separation of siliceous sand, and the subdivision of the entire aggregate of diatoms into the larger and the finer kinds, may be accomplished by stirring the sediment in a tall jar of water, and then, while it is still in motion, pouring off the supernatant fluid as soon as the coarser particles have subsided; this fluid should be set aside, and as soon as a finer sediment has subsided it should again be poured off; and this process may be repeated three or four times at increasing intervals, until no further sediment subsides after the lapse of half an hour. The first sediment will probably contain all the sandy particles, with, perhaps, some of the largest diatoms, which may be picked out from among them; and the subsequent sediments will consist almost exclusively of diatoms, the sizes of which will be so graduated that the earliest sediments may be examined with the lower powers, the next with medium powers, while the latest will require the higher powers."—*W. R. H.*

On Mounting.—Mastic is not soluble in turpentine, spirit being the best solvent; it is also soluble in chloroform, but, like many other gum resins, it contains several constituents, some of which are insoluble in spirit, some in turpentine, and some in chloroform. The evaporation of any of the solvents would throw down the resin it had held in solution, and a pseudo-crystalline appearance would become visible, as seen in all the slides mounted in medium named. Why not use pure Canada balsam? Twenty-five years' experience in mounting Diatomaceæ satisfies me that no medium is so suitable, and none easier to use, provided it has not been mixed with benzole, turpentine, or chloroform, either of which will produce bubbles. When the slide is heated, pure balsam may be hardened without air-bubbles making their appearance. Dilute gum-water is the only medium I know of fixing diatoms, &c.—*F. K.*

Interference of Light.—In using my ¼ objective (100°) with second eye-piece, I find the centre of the field filled with a peculiar brightness that seriously interferes with my view of the object. Can any one tell me what is the cause, and how to get over it?—*J. G. R. Powell.*

ZOOLOGY.

White Woodcock.—It may interest your readers, who, like myself, are lovers of ornithology, to state that a *white* woodcock (*Scolopax rusticola*), a male, was shot on Strensall Common, near York, in October last, and is now in my possession. I think it is unusual to meet with white specimens of that bird.—*C. D. Wolstenholme.*

Scarce Painted Lady.—It may be interesting to your readers to know that I caught on the 2nd of September, a good full-sized specimen of the scarce "Painted Lady" (*Cynthia Huntera*), at Hayling Island, Hampshire. I have not heard of the capture of this rare butterfly in this district before.—*H. W. L.*

Green Sandpiper.—It may interest some of the readers of this paper to know that a friend of mine shot on the 15th of August last, a fine specimen of the Green Sandpiper (*Tringa ochropus*), near Woodbridge, in Suffolk. It perfectly answered to the description given of it in Morris's "British Birds," being specially noticed by the white streaks down its tail-feathers, when it was in flight. I should be glad to know if any other specimens have been shot lately in that county or the neighbouring ones.—*C. W. H.*

Return of our Summer Migrants.—A correspondent at Port Said, in Egypt, writing on the 9th of last month, reports the arrival in Africa of many birds that have been spending the summer in this country. "Ever since the commencement of September," he says, "quail have begun to arrive from Europe, and have been followed by the cuckoo, nightjar, hoopoe, turtle dove, wheatear, teal, and duck, while each day brings flocks of smaller birds whose names it is not in my power to give. Even a few swallows have already put in an appearance; but one swallow does not make a winter, as a still warm sun reminds one."

The House-fly (*Musca domestica*).—The familiar house-fly is apt to be considered an unmitigated pest. It is therefore time to call attention to some recent investigations of a chemist, which go to bear out the pious axiom that everything has its use. This observer, noticing the movements of flies after alighting, rubbing their hind feet together, their hind feet and wings, and their fore feet, was led to explore into the cause, and he found that the fly's wings and legs, during his gyrations in the air, become coated with extremely minute animalculæ, which he subsequently devours. These microscopic creatures are poisonous, and abound in impure air, so that flies perform a useful work in removing the seeds of disease. Leanness in a fly is *prima facie* evidence of pure air in the house, while corpulency indicates foulness and bad ventilation. If these observations are well founded, the housekeeper instead of killing off the flies with poisonous preparations, should make her premises as sweet and clean as possible, and then, having protected food with wire or other covers, leave the busy flies to act as airy scavengers.

Gilbert White of Selborne.—A very interesting series of unpublished letters (ten in number), from the Rev. Gilbert White, author of the "Natural History of Selborne," to Robert Marsham, F.R.S., Stratton Strawless, were read by the secretary of the Norfolk and Norwich Society, at their last monthly meeting. The letters were written between Aug. 13, 1770, and June 15, 1773. The contents consist of remarks on arboriculture; remarks on the rainfall; gossip about birds and insects; and the conformation of Mr. Marsham's supposed discovery of a bird new to Britain, the Wall-creeper or Spider-catcher (*Certhia musaria*, *Tichodrovia musaria*); extracts from his brother's —the Rev. John White, of Gibraltar, who resided there in 1756—unpublished "Natural History of the Rock," in which he describes the difference between the Crag Swallow and the Sand Marten; the former he names "Hirundo hyemalis," from the great numbers that frequent Gibraltar in the winter season. The last letter of the series is dated June 15, 1773, and is probably the last he ever wrote, as he survived only eleven days. It is the intention of the Society to publish these interesting letters in the next part of their Transactions.

Crimson-speckled Footman.—I am pleased to be able to record the occurrence here of a specimen of the Crimson-speckled Footman (*Deïopeïa pulchella*). It was brought to me on the 17th of this month by a little boy who had taken it in a field near here. It was still alive when I received it, notwithstanding some very rough usage it had received in being captured. *Sphinx Convolvuli*, too, seems to be rather common this season.—*E. A. Butler, Hastings.*

BOTANY.

Autumnal Flowering of Spring Wild Plants.—Gentian, primrose, auricula, or other garden spring plants, as your readers are aware, frequently flower again in autumn; and it is not unusual, as some of them may also have remarked, for certain spring wild plants to do the same. Although the daisy, as the poet says, "never dies," yet often at this season it shows a tendency to recover from its late summer deterioration by putting forth "in many a greene mede" a fair sprinkling of starry blossoms. The White and Red Archangels (*Lamium album* and *purpureum*), though they bloom more or less throughout summer, also appear to receive a fresh impulse and "breathe a second spring." The Crosswort (*Galium cruciatum*) not only starts life anew, but flowers until frost puts an end to its career. The Rough Chervil (*Chærophyllum temulentum*) and other early umbelliferæ make an effort in the same direction; but in some specimens it seems rather involuntary, as the blossoms issue from plants that flowered in spring, and now bear umbels of fruit. The Rough Chervil is singularly interesting in this condition, from the colour of its foliage, which, the first flowering hardly over, turns bronzy-red, crimson, or dark brown, making, especially at that time, while it is as yet early summer, a strange contrast to the bright green in which all other surrounding plants are clad. But the autumnal flowering of the earliest member of the order, the Cow-weed Chervil (*Anthriscus sylvestris*) is the most noteworthy instance of the kind that we have seen, as we believe it uncommon for this plant to flower a second time in the year, as we saw it flowering, in September.—*Richard Dickinson.*

Potentilla Norvegica.—Mr. James Abbott showed before the Leeds Naturalists' Society, at its last meeting, a very interesting plant, new to this country, *Potentilla Norvegica.* It grows abundantly on the banks of the canal between Armley and Kirkstall, is apparently naturalized, and must have been there some years, as it was found by Mr. William Kirkby about 1860, and not satisfactorily determined at the time. Mr. Abbott noticed it again in 1874, and in 1875 sent it to Kew to be named, when it appeared that it was a Scandinavian plant, and had only once before been recorded in Britain, and that only in 1868; so that Mr. Kirkby may claim to have been the first to discover it in this country. The question as to how it reached the district awaits settlement.

Isoetes hystrix, Durienæi, vellata, &c., of Algeria.—I regretted I was unable to send specimens with the notice in Science-Gossip of 1873, p. 54, also that I could not at that time obtain a copy of the figure of *I. hystrix*, as well as the other Algerian species which are beautifully given in the *Botanique de l'Algérie*, published by Bory de St. Vincent, by direction of the French Government (discontinued after the first seventeen numbers), but which I am fortunately now enabled to furnish, as well as fine specimens of the three species above named. There appears to be some error regarding the plant found in Guernsey said to be the *hystrix;* it bears no resemblance to the *I. hystrix*, Bory, of Algiers, which it certainly is not; the *I. hystrix*, Bory, of Algiers, has *spines* at the base of each fallen leaf, not much short of half an inch in length, so long that the lower ones actually *overlap* the upper, whereas the two specimens from Ancresse Common, Guernsey, which I have received, have *no spines*, but only very *short teeth*, as in the *I. Durienæi*, Bory. It is impossible to take the two for one and the same plant, as botanists who have compared them together declare; indeed, one of them observed the *I. hystrix*, Bory, resembled a porcupine, on account of its numerous long spines. The plant of Guernsey may be the *Isoetes hystrix* of Gay or Durien (see Science-Gossip of 1873, p. 113), but certainly not the *I. hystrix*, Bory, of Algiers: it would seem to be a separate species, requiring further investigation. The specimens sent me from Guernsey are exceedingly small, though they may be of the natural size and full-grown, as they seem to be; but the smallest specimens of the *Hystrix* found in Algeria, in very dry, hard ground, hardly larger than the specimens from Guernsey, contain spines as numerous and as long (in proportion to the size of the bulb) as the larger ones. With regard to the *Isoetes echinospora* Durien, Hooker, which Mr. Pryor says in Science-Gossip for 1873, p. 87, is, according to Hooker's "Student's Flora," only a sub-species of the *Lacustris*, those who have no doubt examined it more carefully pronounced it a distinct species. Some years back M. Gay, the French botanist, who made an excursion into Wales and examined it on the spot, confirmed the opinion that it is a distinct species: he published an interesting account of the plant, which I had the opportunity of reading at Geneva some years ago. I remember he found a distinction among the various specimens, the nature of which I do not recollect.—*T. B. W., Brighton.*

GEOLOGY.

Underground Waters.—At the recent meeting of the British Association, Mr. C. E. de Rance, F.G.S., read an abstract of the preliminary report of the Committee appointed last year "for the purpose of investigating the underground waters in the New Red Sandstone and Permian formations of England, and the quality and character of the water supplied to various towns and districts from these formations." The Committee have largely circulated a form of inquiry to elicit the information necessary to carry out the investigation. The report now submitted mainly consists of long lists of strata passed through in the sinking of various wells and analyses of the waters obtained. The following are some of the more important results obtained. First, as regards *quantity*, in the Nottingham district the Bestwood pumping station yields more than 3½ million gallons per day from the Pebble-beds, the supply of water from which, as proved by colliery operations in the Newstead area, is practically inexhaustible. The Wall-grange springs, near Leek, in Staffordshire, in the same formation, supplying the Potteries waterworks, also yield three million gallons daily; and in Liverpool and in Manchester the New Red Sandstone yields more than six million gallons per day to the various wells of those districts. Plentiful supplies are yielded by wells in the south-west of England, at Maidencombe, near Torquay; Teignmouth, Tiverton, Dawlish, Bramford Speke, near Exeter; Taunton, Wellington, and Wembdon. In the Midland counties, at Leicester, Nuneaton (250,000 gallons), Coventry (well entirely in the Permian, yielding 350 gallons per minute), Hinckley, Elmsthorpe, and Hathern, where the water rose 50 feet into the air from the Lower Keuper Sandstone. Good supplies of moderately hard water are supplied by New Red wells to Southport, Birkenhead, Ormskirk, St. Helen's, Ince, and a large number of other towns in Lancashire. The available area in England of water-bearing New Red and Permian formations is much larger than the actual outcrop of these rocks as shown on the geological maps, there being extensive tracts of Lias and other newer formations that can be easily penetrated, and a supply of water obtained as at Scarle, in Lincolnshire, where a bore-hole of four inches penetrated the Lias and Keuper Marls, and struck in the Lower Keuper Sandstone a feeder of water, which rose to the surface and yielded eleven gallons. Below this feeder, which occurred at 790 feet, another was struck at 950, which yielded a much larger supply. Second, as regards *quality*. The various analyses obtained place the New Red and Permian waters in an intermediate position between the hard waters of the mountain limestone and chalk and the soft waters of the Palæozoic rocks. In the water obtained from a well at Whitmore, near Crewe, only 6·10 grains of solid matter occur, and in another of the London and North-western Railway wells, that of Parkside, near Warrington, only 11·12 grains of solid matter per gallon occur, the degree of hardness being 4·1 after boiling. The water is stated to be the best for engine-boilers of all the waters obtained on the Company's system. The Permian water of Leicestershire is soft, the water from the Bunter New Red beds nearly soft, and those from the Keuper Sandstone as hard, containing carbonate and sulphate of lime. It is the presence of the last ingredient in the water used in brewing at Burton-on-Trent which is believed to give the Burton water its special pre-eminence in the manufacture of beer. Mr. Molyneux believes the large amount of calcareous ingredients here met with (70 grains in an imperial gallon) to be due to the water dissolving all the gypsum of the Keuper Marls of Needwood Forest, from whence it flows down the dip planes of the strata to the Burton-valley fault, up which it rises, and is tapped by the artesian borings of the breweries. Some of the wells close to the Mersey, at Liverpool, show examples of very hard water, and are daily becoming more so, through the percolation of salt water, induced by pumping inland, but this in no way affects the large wells used by the Corporation for water-supply further from the river. Next year the Committee hope to report—1. On the water-bearing properties of the whole of the English New Red and Permian formations; 2. The nature and chemical character of the waters obtained; and 3. The effect of these waters on the sanitary condition of the people using them. And they cannot but hope that, looking to the almost absolute freedom from organic impurity in water from wells, properly constructed in these formations, they may, by pointing out suitable sites for wells in areas at present without them, be the means in many districts of improving the health and lessening the death-rate of the population.

NOTES AND QUERIES.

LOCAL PLANT NAMES, &c.—The name "Bazier" is commonly used in Devonshire for the Auricula, but I have been always under the impression it was a corruption of "bear's ear."

MALVA.—I am no botanist, but seeing several varieties of Mallows mentioned as having been found on the Sussex shore, I may mention that some seed picked last year from a plant on the cliff at Eastbourne and sown in a garden this year, has attained the great height of over six feet without as yet any sign of blossom—the stems and leaves are likewise gigantic. I fear the winter will kill it, but should there be a means of preserving it, I should be glad to do so, in order to see how large it will grow.—*H.*

COLOUR OF FLOWERS.—I am obliged to Mr. G. Nicholson; but I did not make an *assertion*—I mentioned a *fact*, for which I could not account, and which rather annoyed me. At the end of 1873 I planted crocus bulbs, yellow and purple, in alternate bunches. In the spring of 1874 they came up and flowered properly; they were not disturbed or taken up, but in the spring of 1875 the purple ones all came yellow, with hardly a single purple flower among them. The seeds of the crocus do not, I think, flower in the open ground in one year; and what of the old bulbs? According to Mr. Nicholson, they should have flowered mixed, which they did not.—*E. T. Scott.*

CRICKETS.—In some works crickets are said to produce the noise they make, not with their thighs, nor yet with their wings, but by the friction of their elytra against each other. Could not "W. E." get a pair, and try if he can produce anything like the song of the cricket, or could he not keep one confined, so that he could watch it and see what movement it made? We have no crickets, and I have not seen one for years, or I would try, but I always think it a very cheerful noise.—*E. T. Scott.*

PLANT NAMES.—With reference to Mr. John E. Daniel's inquiry for the botanical name of "Gram," I would beg to mention that it is *Acer arietinum.* This pulse is most extensively cultivated in India, and, when boiled, is excellent food for horses and bullocks; and, when roasted or parched, it forms a good diet for man for long journeys. The leaves are covered with glandular hairs, which secrete a strong acid, much used by the natives of India for dyspepsia. This acid is so pungent, that, if persons were to walk through a gram-field with good boots, the boots would probably be destroyed; but full particulars are given by J. Jackson in the *Food Journal* for March, 1872.—*John Colebrooke.*

CONVOLVULUS HAWK-MOTH.—It may interest entomologists to hear that I have taken two specimens of the Convolvulus Hawk-moth (*Sphinx convolvuli*). I caught them both soon after sunset hovering over a bed of geraniums on the 22nd and 26th of September. Another fine specimen was brought to me by a friend. The largest is 4½ inches in width.—*Frank Morey, Newport, I. W.*

HOW TO REMOVE LICHENS.—Where I live, in the churchyard there are two or three tombstones covered with lichens and mosses. Will some chemist tell me what proportion of muriatic acid I ought to put to a given quantity of water so as to get rid of the lichens, &c., unless any one will kindly suggest a better plan?—*Vagans.*

WASP NEST.—On September 25th, after I had killed between 40 and 50 wasps at and around a hole in a bank, I succeeded in digging out the nest. To my surprise, it was an old one, and inhabited by numbers of wood-lice as well as the natural occupants. Is it usual for wasps to frequent an old nest? And to live in such company?—*F. E. Fletcher.*

GOOSEFOOT (*Chenopodium olidum*).—This member of the family contains a large portion of potass, and its ashes yield a considerable quantity of potash. The plant exhales pure ammonia, Chevalier says, during its whole existence. Can the "incrustation" mentioned by "H. Few," on the white goosefoot, proceed from this cause? provided the white, which is, I presume, a cultivated sort, does possess this same peculiar property as its English relative. —*Helen E. Watney.*

THE SHREW ASH AND THE RUPTURE ASH.—Before commencing my scribble on the above interesting subjects, it will be necessary, I think, to refer to Gilbert White's very charming letter on the subject; for although many lovers of natural history, particularly towards the North of Great Britain, far away from the scene of White's labours, *may* not possibly possess the delightful work iu question, and many even in the South do not allow their young people access to the said book, because it contains many passages hardly fit for the perusal of the young, I have heard that a gentleman well known in the scientific world and a resident at Selborne is about to bring out a new edition. If so, I hope that he will expunge the objectionable passages; so that White's "Selborue" may lie on any drawing-room table, and be read by children of both sexes, and give an incentive to the very delightful pursuit of natural history. In this village, at the corner of the premises of one of the village smithies (there are two), stands an old *hollow* pollard ash, its high top green and flourishing as ever, offering thereby a very pleasing sight to any one who still believes in the rural superstition under notice. This tree's bole is from 10 to 12 ft. high, girting 6 ft. at the height of 5 ft. from the ground; there is a round hole (large enough to admit one's fist) at about a foot from the present ground-level; this hole faces the N.E., and is *nearly* at right angles to the London and Gosport turnpike-road; the other hole is about 18 in. from the ground, faces about S.E., and is at about an angle of 45° to the road or lane which leads to a down on a chalk ridge, called Old Winchester Hill, ou which is situate an oval Roman camp, with ditch and bank in a fair state of preservation. I said *present* ground-level. This requires explanation: the ground floor of the blacksmith's shop in question is now about a yard below the surface of the two roads named. It will be admitted, I think, that an ordinary man, if he takes an auger in his hands to bore a hole, his auger's nozzle will come about 4 ft. or thereabouts up the body of this ash from the ground level. The distance of the holes from the present ground-level is, therefore, no criterion of their former height when they were bored, as it is right the 3 ft. should be added, which has been brought about by the ordinary metalling of the roads as well as extensive alterations carried out by a former rector of this place. I have been abseut from this, my native place, nearly thirty years, and well remember the old cow-leech, who was the proprietor of the smithy iu my young days. The old villager I have mentioned used to "ROWELL" pigs in their ears. It was done by making a hole in their ears between the skin and the gristle, and putting in a small piece of the stalk of the Fœtid Hellebore, or Bear's-foot; hence called Setter-wort (*Helleborus fœtidus*), which he used to grow in his garden. I have seen many times a hole in a pig's ear, when brought to table, as large as a florin. I suppose our forefathers thought that this remedy was efficacious for the murrain in pigs, but why it is now discarded I know not. It was supposed to draw all the ill humours in the pig's system to the "rowell."—*Vagans, West Meon, Hants.*

LOCAL PLANT NAMES.—The name "Bazier," quoted by Helen E. Watney, for the Auricula, is almost certainly a corruption of Bear's-ear, a common name for it, and a translation of the very old name, *Auricula ursi.* I am much interested in these local plant names, aud should be glad to corresnoud with any one on the subject.—*W. G. Piper, Bank Plain, Norwich.*

FIELD CLUBS IN OXFORDSHIRE.—I should be glad to know if there is in this county or in Warwickshire any local natural history society or field club to which lady members are admitted.—*C. Donagan.*

THE BUFFALO.—Why is the unfortunate buffalo in the Zoological Gardens unprovided with the means of having a bath, which must be one of the necessaries of life to this almost amphibious animal? To one who has seen the buffalo herd rush headlong into the water until only their black muzzles remained above the surface, this deprivation of water seems cruel.—*Centurion.*

BASALT.—In the last number of SCIENCE-GOSSIP, Mr. H. P. Malet mentions his belief in the existence of "sedimentary basalt." We should be glad if Mr. H. P. Malet would oblige us by giving a petrological and mineralogical description of his "sedimentary basalt," where he has met with it, aud under what couditions he cousiders that it was formed.—*B. B. W.* and *W. R. J.*

GRAM OF INDIA.—Its botanic name is *Acer arietinum*, and the seeds are used in a variety of ways by the natives in India. A lady, a friend of mine, who had resided there for many years, often put the seeds into soup, as we do pearl barley; she also used the meal in some sort of Indian stock meat, aud in different Indian dishes which she was fond of treating her guests to. The leaves give out a very acid kind of dew, which the natives collect, and bottle up, cousidering it to be a valuable medicine. Has Mr. Dauiel noticed any particular moisture, or exudation on the foliage of the plauts growing in Dorsetshire?—*Helen E. Watney, Berry Grove, Liss.*

SEEDS FOR THE MICROSCOPE.—I send the names of a few seeds which, though common, are, I think, worth looking at. The Dandelion, Sowthistle, Puffball, Fern, Snapdragon, Groundsel, Poppy. The Parsley-seed divided transversely shows the canals which hold the balsamic fluid which gives the flavour; but I think the seed of the Ox-eye Daisy is one of the prettiest when fresh. The body is of a purple colour, with white ribs, through which the spiral fibres can be seen. There are other seeds mentioned in the books on the microscope which are interesting. Different spores are worth getting. —*E. T. Scott.*

CATS AND FROGS.—About a month ago, while walking on the lawn, my attention was directed to Master Tom, who had beeu under one of the bushes and brought out a frog. The cat brought the frog near to me and laid it down on the grass; the frog lay perfectly still, not even appearing to breathe, and after waiting some two or three minutes it jumped some 15 in., when Tom immediately brought it to bay, and gave it a hard bite for its endeavour to escape; the frog again remained still and then attempted to leap; this time it did not go over so much ground. The cat was down upon it in a moment, and bit it much harder, the frog making a peculiar squeak; it again tried to jump; but this time the cat killed the frog, and when I left had commenced eating it. I have never noticed this before in cats, and should like to know if any other reader of "ours" has noticed anything of the kind. —*W. J. Lancaster.*

The Pope as an Aquarium Fish.—Will any reader of Science-Gossip who is practically a keeper of fresh-water aquaria kindly inform me whether a fish called the "Pope" will live in confinement? I have tried many times to keep them, but as yet failed, though tolerably successful with other fish. I have carefully watched them with a view to ascertain, if possible, the cause of death, which is apparently very sudden, but cannot ascribe any particular reason. They have been observed while swimming briskly or busily searching for food, to suddenly turn on their backs and in a short time cease to exist. There has always been plenty of water, about twenty gallons, which is frequently changed, &c., with a proper balance as near as possible of animal and vegetable life. They are an ornamental acquisition to the aquarium, being from three to four inches long, handsomely marked, and when moving along the bottom of the tank with their dorsal fin erect they have a fierce, bold appearance, like "Warriors grim," and are very conspicuous objects. They seldom come to the surface, but remain at the bottom, either at rest or busily searching under the rock-work, &c., for food; even in their liberty are seldom found in shallow water, generally where it varies from four to eight feet in depth. Are they fishes of prey? I had a number of small fish, including several trout, but they did not appear to interfere with them or the other denizens of the aquarium. I intend trying again, but previous to doing so would like to know whether it is an impossibility or not.—*Thomas C. Oborn, Tangley Park, Guildford.*

Sketches in the West of Ireland.—In the exceedingly interesting account of "Post-Christian Antiquities" in your last number, by G. H. Kinahan, Esq., a peculiar custom in building some of the churches is pointed out and accounted for in the following quotation:—"In some of the churches, there are peculiar stone projections from the end walls that look like handles, and seem to suggest that the building was constructed after small wooden models, to which were attached handles for carrying them about." This suggestion appears very probable, but does not early Irish history give us the true source from which these models themselves were copied? We are told that very large numbers of Jews, or rather Israelites, settled in various parts of Ireland and formed very important colonies, established schools, &c. Now, supposing these Israelites were among the early converts to Christianity, what is more probable than that these churches themselves should be constructed after the model of the ark of the covenant, which was always carried about with staves or handles? This ark, we are told, the Israelites brought over with them. The sketch given in fig. 148 somewhat confirms this idea, the shape of the building being that of the ark with a roof or covering.—*C. A. O.*

How do Crickets sing?—"W. B." will find an excellent figure of the musical instrument of the cricket in Todd and Bowman's "Cyclopædia of Anatomy and Physiology"; or, if this book should not be accessible to him, in Staveley's "British Insects," where he will also find an account of the way in which the sound is produced, exactly tallying with that in Science-Gossip for 1865; in Westwood's "Insect Classification," and in other works. "W. B." has to tell us, to establish his own theory of the sound being produced by friction of the legs, either that he has seen the process during its performance, or that he has observed some structure in the legs of the cricket that would produce the sound, or even that it is possible for the cricket to put its hind legs together. Is "W. B." sure that his specimen was not a female?—*W. F.*

Warty Newt.—Early in the spring of this year I secured a female of this species, and kept it in an aquarium in my window along with sticklebacks, having fixed a stone in such a position that it could come out of the water and lie upon it, which it often did; but it would never eat, although offered pieces of small worms and had plenty of water snails if it were so disposed. It changed its skin twice. Its tail was eaten off by degrees to the stump, I suppose by the sticklebacks, but I am not certain; at any rate it died in about three months. I once observed it of a *bright silvery* shade, changing like the chameleon. The only time I ever saw it open its mouth, and, as I thought, going to eat, was one evening when it was lying on the stone. I placed a moth on its nose; it immediately gave two or three respirations and opened its mouth, but it did not eat the moth, which I found in the same place next morning, the newt not having changed its position. I cannot understand how Mr. C. Robson managed to feed them. I may mention I also had plenty of tadpoles in the aquarium, which the sticklebacks made short work of. — *Rev. S. A. Brenan, Pomeroy, co. Tyrone.*

Death of Hedgehogs.—I am glad to see a very grievous subject mooted in your last number under this head, namely, that of cruelty practised on birds and animals by street vendors. I have seen squirrels, apparently tame, sitting on a man's hand; but upon examination have always found that a small piece of tape is fastened tightly round the neck down to the man's thumb, so the poor squirrel is compelled to be "tame," whether he likes it or not. Starlings may be sometimes seen in our busy streets quietly perched on the finger of a cold-hearted Whitechapel bird-catcher; but it is a case of compulsory perching, for both feet are tied on, and the animal or bird, as the case may be, is *undoubtedly* drugged as well. It is time such cruel practices were put a stop to, yet the above is a common sight in the streets of London.—*E. Lovett.*

Stratagems of Birds.—The curious stratagems adopted by many species of birds (as noted in your last) are highly interesting. The practice of luring the obnoxious individual away from the vicinity of the nest, by the parent bird feigning to be wounded, is not uncommon amongst our small birds, whilst the lapwing (*Vanellus cristatus*), on being disturbed from its nest, wheels round and round, uttering its peculiar note, and gradually drawing away the attention of the intruder. I knew one case in which the old bird, maddened by its nest being discovered, flew boldly against the face of its enemy with considerable force.—*E. Lovett.*

STRATAGEMS OF BIRDS.—While walking from Coniston Lake to Hawkhead in June last, collecting some ferns from under the hedge on one side of the road, I disturbed a chaffinch, which immediatefy flew on to the path just in front of me, and at once took my attention. The bird appeared to be in pain, suffering apparently from a broken wing or leg, and I tried to take the bird, but it dodged so much my efforts that I almost despaired getting hold of the bird, but with my umbrella (which the bird had not allowed for) I managed to get hold of it. I then looked at its wings and legs, but could not find a trace of an accident, and thought probably the bird was not well. I then opened my hand, and was in the act of stroking its neck and wings, when, to the great surprise of my brother and self, the chaffinch flew away quickly in the direction from which we had brought it, some 150 yards. It did not occur to me at the time what was the cause of this deception, but I am fully convinced now that it was a trick similar to that you described on page 236.—*W. J. Lancaster.*

THE BUTCHER-BIRD AND ITS PREY. — One evening, while out for a stroll, I observed a number of birds flying about in a very excited manner. On obtaining a closer view, I saw a butcher-bird struggling with a hedge-sparrow, which seemed quite exhausted. I watched them for a few minutes, during which time it had killed its victim; it did not, however, spike it as is usual, but held it firmly to the branch with its claw. Wishing to know further, I threw a stick and made it drop the bird, and on examination I found it had completely scalped and pecked a hole in its skull.—*Thomas C. Oborn, Tangley Park, Guildford.*

"EXCHANGES."—I used to think with your correspondent, that it was not right to exact a stamp with exchanges. When I came to put in exchanges myself I found it out. In my last exchange I should have had to pay a penny for everything I sent, and without receiving a total value of a single penny in return. The arrangement proposed will tend to close your exchange column, and by so doing will take from many of us one reason for taking in SCIENCE-GOSSIP. At present a correspondent knows what he has to pay for an object, and it exercises, shall I say a useful check? upon needless applications. No one is obliged to ask for a stamped envelope unless they choose, and it is rarely done in the case of slides, which are generally a fair *quid pro quo.*

GRANULATION.—What is the cause of granulation in objects that have been mounted some time in unsuitable media? Is there any probable way by which soluble glass could be made that would retain its transparency on solidifying and be suitable as a preservative medium?—*E. G.*

THE BLINDWORM.—A blindworm I have now had in my possession for some weeks, has this morning (Oct. 6) produced ten young ones. Is not this very unusual considering the late period of the year? So far as I am aware, the slow-worm generally produces young in June or July, but perhaps in this case the change of habits in the parent has retarded their appearance. Any information as to how they are to be taken through the winter would be "thankfully received." Will treating them like hybernating larvæ succeed?—*C. Lovekin.*

WHAT IS GRANITE?—In page 296 of "Mangnall's Questions," revised and corrected by E. H. Riches, LL.D., F.R.A.S., &c., is the following query and answer. "What is Granite? A kind of fine white marble found in Spain."—*S. A. B.*

CATS AND FROGS.—In reply to a query in SCIENCE-GOSSIP for October, as to whether cats are in the habit of eating frogs, I can inform W. H. Horne that our cat is particularly fond of them, and I have often observed her on the rockery watching for her prey, which, after tormenting for some time, she will devour.—*Jessie Reeve.*

THE HOLY GRASS.—May I remark, in reply to Mr. Westward's observations on the *Hierochloe borealis*, that it might be well if Mr. Westward would carefully study the growth and appearance or general character of the "Holy Grass" as growing in its natural soil, amidst rocky mountains and in northern latitudes, instead of forming his conclusions from plants cultivated in his own garden. He might then find himself less inclined to contradict the statements of Withering and Bentham. As regards the flowering stems and leaves illustrated in SCIENCE-GOSSIP for August (p. 197), out of the dozen or sixteen specimens in my possession, eight of them were exactly the size represented in the illustration; the others vary in the height from sixteen to eighteen inches; the leaves of all are much shorter than the flowering stem, therefore the difference of growth doubtless depends (as in other plants) upon the habitat of the Holy Grass. There does not appear to me any rule for the exact time of the flowering of various plants and grasses without being liable to exceptions. At the present moment I have by me a fine specimen of the *Caltha palustris* in full flower, brought to me by a friend from the Isle of Thanet, Kent, gathered by him there on the 27th of September. He only observed two other roots in flower besides the one he gathered. Now May and June are the months specified in most of the botanical books for the flowering of *Caltha palustris.* Lindley & Moore mention it flowering from May to August, but it is not, I believe, the experience of botanists generally to find it so, therefore I presume this fact forms an exception to the rule.—*Elizabeth Edwards.*

MIDDLESEX CHALK.—As is well known, the chalk formation appears at the surface in only two limited portions of the county of Middlesex; viz., at the north-east corner, near South Mims, and in the neighbourhood of Harefield, on the north-west. Are there any pits or other accessible sections in either of these localities? I think not at Mims, but my time was too limited to permit a proper search.—*W. H. G.*

CHARLTON SANDPIT.—Mr. Edward Newman, in a contribution to the "Saturday Half-Holiday Guide" for 1873, has the following remarks:—"The disposition of the human aborigines of Charlton Pit to 'turn out' every visitor detected in the act of wearing a coat is remarkable and proverbial. Few entomologists can bear up against it; and this pit, which was the finest collecting-ground near London, is now nearly abandoned." Will some South London entomologist kindly inform me if this alarming state of things still continues? Are the "noble savages" as jealous of intrusion as in 1873, and cannot their antipathy to strange faces and cloth coats be overcome, either by law, stratagem, or civility? Perhaps some brother of the net and pin can throw light on the present condition of this queer "preserve."—*W. H. G.*

FOSSILS NEAR WATFORD.—In the very useful "Saturday Half-Holiday Guide" for 1873, mention is made of a chalk-pit in Berry Wood, near Aldenham, one mile and a half from Watford, abounding in well-preserved fossils of various kinds. May I ask if this pit is still available to the geological excursionist?—*W. H. G.*

WHITE BEES, &c.—A subscriber would be glad if any of your correspondents can inform her what are the "White Bees," which bees occasionally turn out of their hives, and why they put them out. The only mention she finds made of them in Pettigrew's "Handy-book of Bees" is, that the bees turn them out when "on the border-land of starvation." She has only begun to keep bees this year, and during the wet weather had four white bees put out, and later, two, very small ones. She has fed the bees constantly during wet weather, and on rainy days.——Also, can any contributor to the SCIENCE-GOSSIP explain the formation of stones called "Mocoes," found at Aberystwyth, and probably other places on the Welsh coast? When cut and polished, they are like pieces of sea-weed floating in the stone, which is transparent, as if water and weed had both been suddenly changed to stone. The weed in many cases is very perfect, and there are several different kinds. Are they petrifactions, or fossils? And are they of modern or ancient formation? I have been unable to find any description or account of them in the books I have been able to refer to.—*E. A. K.*

POPLAR HAWK CATERPILLARS.—I have reared a considerable number of these caterpillars from the egg upwards, but have never experienced what your correspondent states in the September number of this magazine. When first hatched they were very delicate indeed, generally half their number dying; but after they once got over their first moult they were as voracious and healthy as could be wished. The young caterpillars should be kept in a small box, until they are large enough to be removed into the breeding-cage, as this prevents their wandering too far away from their food, which is an important point when they are very young. Many people seem to think that young caterpillars require young and tender leaves; this is true enough, and holds well with many species, but certainly not those feeding on poplar, as the young leaves and shoots are always more or less covered with a gummy substance, which seems to answer the same purpose as birdlime, for no sooner do the young caterpillars attempt to walk over them than they stick fast, and soon die. I have lost numbers in this way. I need hardly say that they should be handled as little as possible, and not kept in a very warm room.—*C. P. Hall, Woolwich.*

OXEN AND MUSIC.—I have often noticed the power music has over oxen. The other day we had a brass band playing in our garden. In a field adjoining were four Scotch oxen; when the band struck up—they were at the far end of this, a nine-acre field, quite out of sight, the field being very uneven—they set off full trot to the garden wall, put their necks over, and remained so till the tune was finished, when they went back to graze; but as soon as it struck up again, they put their heads over the wall again. This went on till the band left, after which they ate little all day, and were continually lowing.—*L. W.*

FROGS AND GOLDFISH.—A friend of mine had a small pond, in which he kept goldfish. These began to die very fast. He could not account for it at all: till at last one night he went very quietly up to the pond, and to his surprise saw four frogs, each swimming on the back of a goldfish, holding on by their webbed feet; the fish were swimming with their backs out of the water, and seemed as if they could not descend with their riders. In time all the fish died. Can it be accounted for by the frogs on them?—*L. W.*

SPARROWS AND PEAS.—Sparrows (*Passer domesticus* and *P. montanus*) do an unknown amount of harm in the kitchen garden, by eating the young shoots of beet, peas, and beans. My peas were kept back a fortnight, and the beet is quite ruined this year. I was told soot would stop them; so I got some, and after I had sown my peas, I covered them over with it, and they have not been touched. What can there be in soot that keeps them off?—*L. W.*

DEATH OF ROBINS.—There is a saying in North Lincolnshire that all the two-year-old robins (*Erythaca rubecula*) kill all the three-year-old birds in autumn. Is there any truth in this or not? I have watched them for some years, and certainly they are a quarrelsome set, but I have not found that they kill each other. There is also a belief that it is unlucky to take robins; so, when all other birds' nests are taken, it is watched with reverent care.—*L. W.*

CRABS OUT OF WATER.—On Tuesday, September 7, the gardener, in procuring a can of seawater for the aquarium, captured a few small shore crabs, known here as "king crabs" (*Carcinus mœnas*), one or two of which escaped from the can after it was brought into the garden. On the 9th one of the crabs was found walking about on the stone steps, apparently none the worse for forty-eight hours' absence from the ocean. A trifling shower on the morning of the 8th might have supplied it with a little moisture which would probably be beneficial, though immersion in fresh water is fatal to marine crustacea.—*G. Guyon.*

FISH-CANS.—"A self-air-acting fish-can" is referred to by A. G. R. Sclater, in his notes on "Goldfish Breeding," in September SCIENCE-GOSSIP. What sort of can is this,—can he describe the arrangement?—*G. S.*

COMMUNICATIONS RECEIVED UP TO 9TH ULT. FROM:—A. P.—E. T. E.—W. P.—W. K. M.—Dr. R. M. B.—J. E. L.—T. G. P. Y.—G. G.—W. H.—F. K.—E. L.—A. B.—R. C. B.—J. C.—T. J. B.—S. A. S.—J. B.—J. F. R.—H. W. L.—C. P. H.—E. A. K.—W. H. G.—J. H. M.—L. W.—C. O. G. N.—G. S.—J. A. jun.—Dr. G. B.—S. J. B.—W. H. H.—W. T. B.—F. J. A.—E. W. A.—Dr. C. R. A.—B. B.—E. A. B.—W. G. P.—W. J. H.—J. P. W.—W. K. G.—W. H. G.—B. B. W.—W. R. J.—E. T. S.—F. E. F.—W. T.—C. D.—W. H. H.—W. T. S.—W. E.—F. H. A.—C. H. M.—F. M.—J. C.—W. J. L.—F. E. F.—H. E. W.—P. S. S.—H. G. G.—C. L.—J. G.—T. R.—J. G. R. P.—S. A. B.—G. C. D.—J. B.—J. R.—W. H. C.—H. S. F.—C. D.—F. H. W.—C. D. W.—F. W. M.—R. D.—W. A. L.—E. J. L.—D. M.—T. H.—R. H. P.—E. C.—T. B. W.—J. I.—C. T. F. N.—W. F.—C. A. O.—E. E.—C. A.—G. H. K.—J. R. S. C.—T. C. O.—W. R. H.—M. P. E.—E. M.—E. L.—J. S. H.—E. D. B. M.—W. W.—C. L. J.—W. C. &c. &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

Flowering Rush.—The correspondent who wanted this plant in *exchange* for Sundews, &c., forgot to give his name and address.

W. H. Hatcher.—No specimen of green flower was enclosed in your note. It must have been omitted in sealing.

C. W. H.—One of the best Elementary books on Zoology is Prof. Nicholson's, published by Blackwood, at 2s. 6d.

W. L. W. E. (Winchester).—Your plant is *Rubus odoratus*.

The Wanderer.—You are correct in supposing the species to be insectivorous: it is the *Drosera binata*, closely allied to the elegant little Sundews of our bogs.

H. F. E. W. (West Meon).—The shrubby plant, with spines without flowers or fruit, is indeterminable. Perhaps you would look out for flowers next season. The common, or local names of plants or trees, are never very reliable, they vary much with locality. We shall at all times be most happy to aid you; you cannot send us too many queries.

C. T. (Bournemouth).—It is not *M. altissima*, but, as you imagine, the true *Melilotus alba*.

W. A. Law.—Your specimen is a Myriapod (*Geophilus electricus*), well known for leaving a phosphorescent trail on damp hedge-banks, &c. It is not an uncommon insect.

W. Farrow is desirous of obtaining specimens of the Grass of Parnassus. Will some of our readers send a specimen?

S. J. Barnes.—You can obtain, mounted and named, British Sea-weeds either separate or as a perfect collection, by applying to 192, Piccadilly.

D. O. N.—One of the handiest books we know on the subject is William Swainson's "Treatise on Taxidermy."

T. J. B.—We would advise you to get "Wild Flowers worth Notice," by Mrs. Lankester, published by R. Hardwicke, 192, Piccadilly.

E. M. Greenfield.—You can gain what information you require by applying to Van Voorst, the publisher of the books you mention.

E. W. Andrews.—The objects enclosed were the egg-capsules of a species of *Natica*.

EXCHANGES.

Eggs of Golden Plover, Ring Ouzel, Lesser Redpole, Mountain Linnet, Kingfisher, for other good Eggs.—Address, Jas. Ingleby, Eavestone, near Ripon.

Wanted, Parasites, mounted or unmounted; will give other Material unmounted.—F. E. Fletcher, Eastnor House, South Norwood.

Mentha rotundifolia, for any of the following Labiatæ:—945, 948, 949, 954, 956, 958, 965, 966, 971, 985.—Rev. F. H. Arnold, Fishbourne, Chichester.

For large Male Antenna of Bombyx Yama-mai, send a stamped directed envelope to W. H. Gomm, Somerton, Taunton.

Mounted Tentacle of *Drosera rotundifolia*, for other well-mounted Slide.—J. B., 224, West George-street, Glasgow.

Wanted, Parasites, mounted or unmounted, for other Material unmounted, or Coloured Varnish for ringing.—F. E. Fletcher, Eastnor House, South Norwood.

Malva borealis, for Nos. 1302, 1487, or other rare plants.—C. A. Oakeshott, 8, St. Andrew's-square, Hastings.

For Sheep Tick, *Melophagus ovinus*, mounted in balsam, send any good Slide to A. Haward, 1, Shirley Villas, Addiscombe, Croydon.

Rosa Wilsoni et sylvestris (Menai Bridge), for other Roses, &c.—H. S. Fisher, 1, Gladstone-road, Edge-hill, Liverpool.

Eggs of Heron, Grouse, Guillemot, Sandpiper, Sandwich Tern, Black-headed Gull, and Green Woodpecker, for other good specimens.—Alfred Bindon, 22, Argyll-street, London, W.

Eggs of Lesser B. B. Gull, Pratincole, Sandwich Tern, Kentish Plover, and Fieldfare, for other rare Eggs.—C. Dixon, 60, Albert-road, Heeley, near Sheffield.

Offered, good specimens of *Sphinx Convolvuli* for *Sphinx Pinastri*, or specimens of the *Deilephilæ*.—Rev. F. H. Wood, 2, Clarence Villas, Finsbury-park, London.

A few Beetles (continental species), mounted and named, offered for odd Nos. of Gossip, for 1874.—G., 15, Thornhill-road, N.

A few specimens of Lepidoptera, Shells, Birds' Eggs, and Minerals.—G. T. F. Napier, Alderley Edge, Cheshire.

For well-mounted section of Ivory, send really good Slide (number limited) to J. Green, March.

Hair of Opossum (unmounted), for any object of interest, also Foreign Shells for others.—F. W. M., 40, Bengal-street, Bradford.

Eggs of Teal, Heron, Quail, Kestrel, Sparrow-hawk, Carrion Crow, Coot, Stonechat, Lesser Redpole, and others, for good Lepidoptera.—W. Howard Campbell, Ballynagard House, Londonderry, Ireland.

Unmounted Microscopic Material for other, or for Slides. Lists exchanged.—R. H. Philip, 28, Prospect-street, Hull.

Wanted to purchase for herbarium, rare European and other Saxifrages.—Address, T. H., Highfield, Sydenham-hill, London.

Correspondents wanted abroad to exchange British Lepidoptera for those of foreign countries. I would also exchange British Lepidoptera for Birds' Eggs.—W. Watkins, 21, Caves-terrace, Shepherd's-bush, W.

Colchicum in flower, *Linaria spuria*, and *Elatine*, *Eriocaulon septangulare*, *Scirpus pauciflorus*, for other plants.—G. C. Druce, Northampton.

Helianthemum guttatum (Mill), from Boffin Island, co. Mayo; also *Menziesia polifolia* (Juss.), from Connemara, for rare British Plants.—Richard M. Barrington, LL.D., Fassaroe, Bray, co. Wicklow.

Wanted, Nos. 149b, 870, 878, 1266, 1604b, 1616b, 1623b, 1634b, c, 1636, 1649, 1653; offered: 158, 235, 236, 237, 239, 253, 304, 305b, 306b, 328, 330, 335, 388, 611, 749, 835b, 887, 923, 1004, 1344, 1345, 1375, 1376, 1466, 1483, 7th edition, London Catalogue.—James Cunnack, Helston, Cornwall.

Cuba, Jamaica, and South Sea Shells, Tropical Seeds, Minerals, Adriatic Seaweeds named, for Micro. Slides.—N., 18, Elgin-road, St. Peter's-park, W.

Wanted, *Helix virgata* or *rufescens* (from localities north of Leeds), *Pupa secale*, *Anglica* or *Muscorum*; offered: *Clausilia biplicata*, *Zonites nitidus*, *Assiminea Grayana*.—W. H. Hatcher, Belmont Works, Battersea, London.

Wanted, Slides, well mounted, illustrating Physiology and Anatomy; will give two good Slides for one good Slide showing sweat-ducts and glands plainly. Great many Slides to exchange.—W. Tylar, 165, Well-street, Birmingham.

Mahogany, cork-lined, air-tight case, with over 200 specimens of British and Foreign Beetles; also a similar case with a few Orthoptera and Lepidoptera, for Microscopic or other articles.—W. G., Gordon-street, Nairn, N.B.

Wanted two or three dozen each of the larger British Land and Freshwater Snails, *H. aspersa*, *H. pomatia*, *L. stagnalis*, &c., alive. First-class Micro. Slides or Cash.—C. L. Jackson, Hesketh, near Southport.

Linnæa glabra offered for *Helix lamillata*, *H. revelata*, *H. obvoluta*, *Bulimus montanus*, *Clausilia Rolphii*, *C. laminata*, *C. biplicata*, *Cyclostoma elegans*, &c.—Edward Collier, 6, Short-street, Tib-street, Manchester.

Wanted, Healthy Plants of Flowering Rush (*Butomus*), Arrowhead (*Sagittaria*), Water Soldier (*Stratiotes*). Good Plants of Sundew, *Drosera rotundifolia* (see Darwin's "Insectivorous Plants") will be given.—Miss E. De B. Meyrick, Downshire Lodge, Blessington, co. Wicklow.

Hyas araneus, *Corystes Cassivelaunus*, and other Crabs for *Lithodes maia*, *Nephrops Norvegicus*, or other northern species. Lists exchanged.—Thos. Russell, 48, Essex-street, Strand, W.C.

Smith's best ¼th Objective, with screw adjusting collar, and Kirby & Spence's "Entomology," 4 vols., original edition, with MS. notes, by Mr. Spence, for a good ⅛th or $\frac{1}{12}$th. A little cash given as well, if required.—J. S. Harrison, 48, Lowgate, Hull.

Cornish Plants:—125, 139, 854, 944, 946, 947, 948, 956, 981, 1052, 1389, 1401, 1485, 1486, 1508, 1651, London Catalogue, 7th edition.—Wm. Curnow, Pembroke Cottage, Newlyn Cliff, Penzance.

Duplicates of *H. velleda*, *L. complanula*, *E. jacobææ*, *C. dominula*, *L. chrysorrhœa*, *L. auriflua*, *L. dispar*, *W. sambucata*, *M. margaritaria*, *D. aversata*, *F. piniaria*, *M. ocellata*, &c. &c. Desiderata: Lepidoptera, Birds' Eggs, or Mollusca.—W. K. Mann, Granby House, Granby Hill, Clifton, Bristol.

BOOKS, &c. RECEIVED.

"Climate and Time." By James Croll. London: Daldy, Isbister, & Co.

"The Dawn of Life." By Principal Dawson. London: Hodder & Stoughton.

"Introductory Zoology." By Prof. Nicholson, 2nd edition. London: W. Blackwood & Son.

"Zoology for Students." By D. Carter Blake. London: Daldy, Isbister, & Co.

"Report of Botanical Localists' Record Club."

"How to Use the Microscope." By John Phin. New York.

"Monthly Microscopical Journal." October.

"Popular Science Review."

"Canadian Entomologist."

"American Naturalist." August.

"Land and Water." October.

"Les Mondes." October.

"Monthly Journal of Education." October.

"Ben Brierley's Journal."

HISTORY OF OUR CULTIVATED VEGETABLES.

No. XIV.—THE ARTICHOKE (*CYNARA*).

THIS singular, but handsome vegetable, is nearly allied to the *carduus*, or thistle, and is a native of some of the warmer parts of the temperate zone; it is also considered to be indigenous to the countries which bound the Mediterranean, as well as the islands which are situated in that sea. It is almost impossible to trace when this vegetable was first used as food, but Dioscorides mentions it more than half a century before the Christian era. Two Greek authors, of an early date, recommended mothers desirous of having male children to partake freely of this vegetable. Both Greeks and Romans appear to have procured this plant from the coast of Africa, about Carthage, and also from Sicily. This vegetable is said by Pliny to have been more esteemed and to have obtained a higher price than any other garden herb. He was ashamed to rank it among the choice plants of the garden, being, in fact, no other than a thistle. He states that the *thistles* about Carthage and Corduba especially, cost the Romans annually 6,000,000 sesterces, about £30,000 sterling; and concludes by censuring the vanity and prodigality of his countrymen in serving up such things at table as the very asses and other beasts refuse, for fear of pricking their lips. We are also informed by the same author that the commoners of Rome were prohibited by an arbitrary law from eating this vegetable. The Romans used to preserve the artichoke in honey and vinegar, and season it with the root of laserwort (*Laserpitium glabrum*) and cumin (*Cuminum cyminum*), by which means they were to be had every day in the year. The juice of the artichoke, pressed out before it blossomed, was used by the ancients to restore the hair of the head, even when it was quite bald. They also ate the root of this plant (as well as that of the thistle) sodden with water, to enable them to drink to excess, as they excited a desire for liquor. Columella notices the same quality in the artichoke, but intimates that it injures the voice,—

> "Let the prickly artichoke
> Be planted, which to Bacchus, when he drinks
> Is grateful; not to Phœbus, when he sings."

Pliny tells us that these thistles are grown in two different ways, from plants set in the autumn, and from seed sown before the Nones of March (7th), in which case they are transplanted before the Ides of November (13th), or, where the site is a cold one, about the time when the west wind prevails. They "are sometimes even manured, and, if such is the will of Heaven, grow all the better for it."

Bechmann, in his "History of Inventions," made very laborious researches to ascertain the positive antiquity of the artichoke, and these discussions are both curious and interesting. We find the first mention of this vegetable, in more modern times, about the fifteenth century, when it was introduced into Italy from the Levant, and considered as a new species of food. In 1466 one of the Strozzi family brought the first artichokes from Florence to Naples. A commentator of Dioscorides, Hermoleus Barbarus, who died in 1494, relates that this vegetable was first seen in the Venice garden in 1473, at which time it was very scarce. It was introduced into France at the beginning of the sixteenth century; and not many years after, during the reign of Henry VIII., was first transplanted into our gardens. In the Privy Purse expenses of this king we find several entries regarding artichokes. Thus,—"Paied to a servant of maister Tresorer in rewarde for bringing Archecokks to the king's grace to Yorke-place, iiijs. iiijd." A treatise, written in the reign of Mary, on the "best settynge and keepynge of artichokes," is still preserved in the Harleian Library, of which it forms the 645th number.

Gerard has left us correct representations of both the French and the Globe varieties, but makes no mention of their country or their introduction; we may therefore conclude that they were become common in 1596. By reason of the great moisture of our climate, and the attention which was paid to its cultivation, the artichoke soon became so much improved in size and flavour that the Italians sent for plants from England, deeming them to be of another kind; but they soon returned to their natural size when restored to that country. In its wild state the plant is said to be taller, more downy and spinous, than it appears in our kitchen-gardens. It is cultivated in almost every part of Europe, but in England it is grown rather as a luxury than a profitable succulent. On account of the great size of its roots, and of its penetrating the soil so deep, it withstands the dry and hot summers about Paris, where they are most extensively cultivated and most abundantly used. Artichokes are a favourite dish at a French breakfast; sometimes they are eaten uncooked in a young state as a salad. The young heads, when about 2 in. in diameter, make excellent pickle. In England they are generally boiled, and the scales of the calyx are then plucked off one by one, the lower part of them dipped in melted butter, and the fleshy substance sucked from the rest. But there is generally so little to be obtained, as almost to justify the observation of a raw country servant, who, having waited at supper when artichokes made one of the dishes, was eager on his return to the kitchen to taste a kind of food he had never seen before, but to his great disappointment, finding little more than a horny substance which equally defied his tongue and his teeth, declared with great naïveté that gentlefolk seemed to him to have strange fancies, for, as far as he could discover, one leaf would do as well to lick up butter as a thousand. It was fortunate for him that he did not encounter what is emphatically styled, the "choke," from not an ill-founded persuasion that any unlucky wight who should happen to get it into his throat would certainly be choked. This consists of the unopened florets and bristles which stand upon the receptacle of the compound flower, and must be carefully cleared away before the epicure can arrive at the receptacle itself, the *bottom*, as we call it, or *le cul*, as it is more elegantly termed by our polished and refined neighbours on the other side of the Channel, which is undeniably the most plentiful as well as the most delicate part of the viand; and in France it is esteemed a branch of good housewifery to preserve this part to the use of the family during the winter. (Rees's "Cyclopædia.")

The artichoke, like the asparagus, is naturally a maritime plant, or at least one which thrives best on soils where there is a mixture of saline or alkaline matter. In the time of John Evelyn, 1699, the island of Jersey was famous for its artichokes, on account of the seaweed used in manuring the land; and it is said that in the present day this vegetable is successfully cultivated in the Orkney Islands from the same cause.

Medicinally, the stalks are considered aperient and diuretic; the leaves in their natural state. boiled in white wine whey, are thought beneficial in the case of jaundice; and when cut into pieces and steeped in sherry wine, are an excellent antibilious medicine.

The generic name *Cynara* is said to be derived from the word *cinis*, because, according to Columella, the land for artichokes should be manured with ashes; and Gerard says the same thing. Parkinson says it is so called from the colour of its leaves. Heathen mythology informs us that Cynara was a young and beautiful girl who had the misfortune to displease one of the gods, who instantly metamorphosed her into an artichoke. (Ruell, i. 20.) Respecting the origin of the word artichoke, various conjectures have been formed. It has been by some authors derived from the Greek word *coccalon*, which signifies a fir-cone, with the Arabic *al* prefixed; this, again, has been denied, and the word drawn from the Arabic name, *harxaf*, or *harchiaf*.

The artichoke has been introduced into the Pampas of South America, and has spread over a large tract of country in such abundance as to form impenetrable masses when in flower. (*Vide* Oliver, "Lesson in Elementary Botany.")

HAMPDEN G. GLASSPOOLE.

THE RESTING SPORES OF THE POTATO FUNGUS (*continued*).

By WORTHINGTON G. SMITH, F.L.S.

SINCE this subject has been made public, Mr. Carruthers has kindly furnished me with a copy of Dr. Farlow's paper on the Potato Rot, extracted from the "Bulletin of the Bussy Institution," part iv., a paper I had not previously seen. As some of Dr. Farlow's practical observations seem to have a direct bearing on some of the points raised by me, I will conclude by extracting one or two sentences:—"The disease is first recognized by brown spots on the leaves" (p. 320). "If we examine any potato-plant affected by the rot, even before any spots have appeared on the leaves, we shall always find these threads in the leaves, stem, and, in fact, nearly the whole plant" (p. 322). "The Peronospora is much more easily affected by moisture than the potato-plant itself." "Suppose the temperature to keep equally warm, and the atmosphere to become very damp, then the absorbing power of the mycelium is very much increased, while the assimilating power of the leaf-cells is little altered. Thus it happens that a sudden change from dry weather to moist will cause the mycelium to increase so very much beyond the power of the potato-plant to support it, that in the struggle for existence the latter blackens and dies." "When the disease has arrived at a certain point, viz. just about the time of the appearance of the spots on the leaves, these mycelial threads make their way into the air" (p. 323).

I give in conclusion an illustration of the perfectly mature resting spore of *Peronospora infestans*, as seen imbedded in the substance of the potato-leaf. These resting spores, which carry on the winter life of the fungus, are not restricted to the leaves, for I find them sparingly in both haulm and tuber, although I have at present seen the best specimens in the leaves. The engraving given herewith (fig. 164) shows a transverse section through a black spot of one of the leaves from Chiswick, and the resting spore is seen at A, nestling in amongst the cells of the leaf. An antheridium, B, and two oogonia (C, C), from which such resting spores arise, may be seen in the cut, and the old common form of the fungus will be noticed breaking through a hair on the upper surface of the leaf, which is a very uncommon occurrence. The situation of the resting spores can generally be ascertained on the leaves by noticing the slightly thickened and very dark spots, for the bodies are commonly in these spots. It is, however, an extremely difficult matter either to get them out, or, indeed, to see them when imbedded, for, when mature, they are black-brown in colour, and only a little larger in size than the leaf-cells. These leaf-cells are also intense brown-black in colour, from contact with the hurtful mycelium, and almost as hard as wood. The best way to see the resting spores is to macerate the leaves for several days in water, and then set them free by crushing the spot between two slips of glass. The presence of the fungus in the leaf makes the cells very thick and woody as well as black, so that in crushiug the leaf-cells the resting spore is not uncommonly crushed at the same time. With care, however, they can be got at, when they will be seen, as at D, covered with warts or coarse reticulations, and beautifully regular and perfect in outline: when young they are of a pure warm sienna colour, and when perfectly mature, brown-black and shining. They are spherical or slightly egg-shaped, and measure on an average about one-thousandth of an inch in diameter. I consider it worthy of special note that these resting spores are almost exactly the same in size, conformation, and colour with *Peronospora arenariæ*, Berk., an allied species found parasitic on *Arenaria trinervis*. In looking for these bodies care must be taken not to confound them with corroded cells, granules of starch injured by the disease, or foreign bodies.

At E is shown a semi-mature resting spore with pollinodium attached, accidentally half washed out of its coating of cellulose by maceration in water.

I may say, as an addendum, that to me there is a marked analogy in size and habit on the one hand between the oogonia and the vesicles which contain the zoospores, and on the other hand between the simple spores and the antheridia. I consider that the oogonia and antheridia are merely the intercellular condition of the vesicles which contain the zoospores and conidia, which latter are the aërial state of the former.

The facts which point in the direction just indicated are these: sometimes there is no differentiation in the contents of the vesicles, but the plasma is discharged in one mass and not in the zoospore condition; the vesicle then resembles the oogonium. At other times the oogonium shows a distinct differentiation in its contents, and matures from one to three resting spores, which to me shows an approach to the condition of the vesicle which usually gives birth to the zoospores.—See also the *Gardener's Chronicle*, July 17 and 24, from which the above plates have been taken.

Since the above observations were printed, the following facts have been observed by me, and recorded in the *Gardener's Chronicle* for July 31.

1. Some plants sent to the Royal Horticultural Society by Mr. Dean, on July 21, were covered with the Peronospora far beyond anything I had ever seen before. The haulm, the leaves (on both sides alike), and the berries were covered. Some of these plants, after being placed on a garden bed, and covered with leaves (to keep them moist), were the next day one white mass with the Peronospora.

2. The potato fungus (as commonly seen) bears a far larger number of simple spores than inflated vesicles containing the zoospores or swarm-spores, but in Mr. Dean's plants the fungus produced zoospores almost exclusively, and in the greatest abundance. As the zoospore is a higher development of the plant than the simple spore, this latter observation points to the unusually robust health of the fungus this season.

3. Ou suspending the iufected leaves over a glass of water for from twelve to seventy-two hours, the swarm-spores fell in abundance (either free or in the vesicle) on to the water, and there germinated. No single drop of the water could be taken up for examination without meeting with the germinating spores, the threads radiating over the water in every direction, evidently in quite a congenial element. It brought the following fact to light, which is of importance: some of the vesicles which usually discharge the zoospores discharged instead a thick mass of mycelium; and this cord, when it had proceeded a considerable distance over the water, there

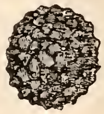

Fig. 165. Mature Resting Spore.

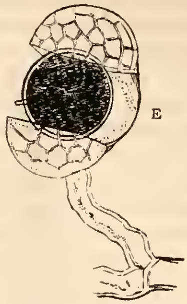

Fig. 166. Semi-mature Resting Spore, × 400.

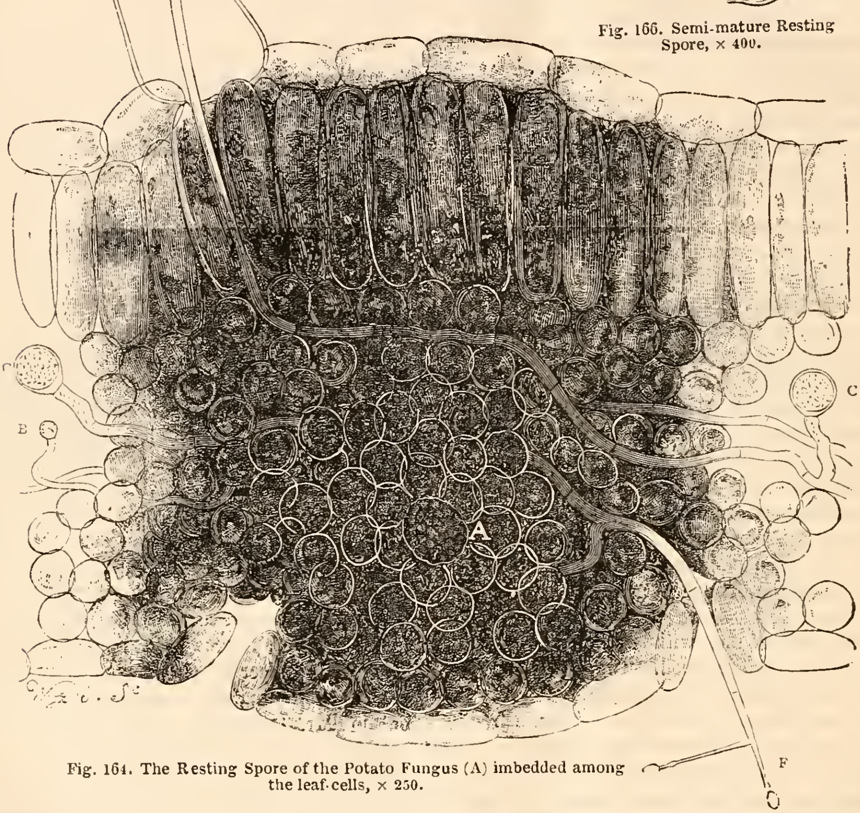

Fig. 164. The Resting Spore of the Potato Fungus (A) imbedded among the leaf-cells, × 250.

had its contents differentiated in a necklace-like manner, and gave birth to the zoospores far removed from the original vesicles. The same thread also produced two true oogonia on the water.

4. At the meeting of the Scientific Committee of the Royal Horticultural Society, held on July 21, Mr. Renny showed a species of Saprolegnia which, he said, might be mistaken for Peronospora. But if reference is made to my original paper, it will be seen from the first that I have perceived the intimate connection between the new condition of the potato fungus and the Saprolegnieæ. On my side I have the high authority of Thuret and Berkeley for similar alternation in the diseases of silkworms, flies, &c. I am quite prepared, therefore, to consider Mr. Renny's plant, if not the same, some close ally with mine, even if it should turn out to be a true Pythium, and its oogonia produce zoospores in water, especially after what is known of the nature of Cystopus, the close ally of Peronospora. Two strong points in favour of this view are these: (1) The resting spores of Pythium are *unknown*, but if I find Pythium inside potato stems and leaves mixed up with the Peronospora, and the same Pythium in the very centre of the tuber of the potato (as I have done), there maturing itself and forming its resting spore; then the identity of the two may reasonably be assumed, and the resting spore of the

Pythium, as well as the Peronospora, is found. (2) The same cells in the Saprolegnieæ will alternately produce, under the same (or different) conditions, zoospores or resting spores; therefore, if zoospores are produced in Mr. Renny's oogonia in water, it is reasonable to assume that under different conditions resting spores would be formed by similar cells. I have, from the first, believed the Saprolegnia condition of the fungus to be widely diffused, and when in that state it quite possibly grows on diverse plants and substances in watery places, as was explained by me. The Saprolegnia is the caterpillar condition (belonging to the water, like the larva of the dragon-fly), the Peronospora somewhat analogous with the perfect butterfly, and the resting spore with the dormant chrysalis.

5. I find by experiment, when badly diseased haulm, fruit, and tuber are partly submerged for from one to four days, the Peronospora changes its character, and produces the Pythium or Saprolegnia-like growth on the submerged parts. On examination of the plants, this may be easily overlooked, as the Saprolegnia commonly frees itself and floats on the surface of the water, and must be carefully taken off (invisible as it is) with a camel-hair pencil. If the oogonia now produce zoospores in the water, as in Pythium, which is possible and even probable, it in no way invalidates my views, or makes the connection less probable between Pythium and Peronospora.

6. The aërial spores of the Peronospora never become globular in water, whilst the oogonia and antheridia are always so.

7. A superabundance of water excites the growth of the mycelium, but it retards the proper production of the resting spore, just as a superabundance of water in most plants makes leaves and retards flowers.

8. In my calendar of the weather I find we had here only five wet days from May 7 to June 10 (no wet between May 8 and 20), and it was during this dry weather that the potato fungus this year lived inside, and at the entire expense of the plant, and there perfected its resting spores. With the twenty-two wet days after June 10 the Peronospora put on its usual shape, and came to the surface.

9. I have got my most abundant materials from the tuber when soft and almost transparent, like painters' size. In this state the starch is utterly destroyed, and, what is most curious, there is no offensive smell. The tuber frequently decomposes with a horrible fetor, and turns whitish inside; the starch is then present, and more or less injured, and very little can be seen of the fungus.

10. The season is too far advanced, and the fungus has already caused too much destruction to think of grappling with it this season, but when it is remembered how the vine, the corn, and hollyhock parasites have been restrained, it certainly does not seem impossible that means may be found to mitigate the damage done every year by the potato murrain.

ON SETTING AND PRESERVING HYMENOPTERA.

MY attention having been attracted by an article under the above heading in your October number, I trust I may be allowed to make a few suggestions thereon. In the first place, to my mind the method pursued by Mr. Bridgman in killing his specimens is far too complicated. He first stupefies the insects with cyanide of potassium, then pill-boxes them. When they have revived, he doses them with chloroform; and then, lest they should survive this treatment, he subjects them for the space of three hours to an elaborate sulphur-bath, whence they are transferred "into a damp box for twelve or more hours." Cyanide of potassium has two objections. It is apt to turn the colour of some insects. Sulphur has the same objection; and the vapour it evolves is unpleasant to inhale, causing headache and nausea with some people. Chloroform is expensive, difficult to keep, on account of its rapid evaporation, and dangerous. The plan I have found most efficient, and I believe there are few I have not tried, is as follows:—

On a fine, dry day collect some couple of dozen or so of the common green laurel-leaves: be sure they are perfectly free from all external moisture, or they will be likely to turn mouldy. Then procure a wide-mouthed bottle; cut the leaves into small pieces, and fill to within two inches of the mouth. Cut also some paper discs, the size of the bottle, and press them flat on the top of the leaves; two will be sufficient. In a few days the leaves will turn brown, when it is ready for use.

This is my Store-bottle.

For the sum of one shilling you can purchase at any entomological "naturalist's" one of the zinc pocket collecting-boxes Mr. Greene recommends. Fill the chamber beneath the perforated bottom with equal parts of camphor and ammonia, and then you will have one of the most powerful killing-boxes extant. When out collecting, it is as well to have two of these boxes in your pocket; and when you have some fifteen or twenty specimens in one, use the other for a time. Then you can empty the contents of the first one into a pill-box, and it is ready for use again. There is one disadvantage in connection with the box; viz., the inside surface of the overlapping part of the lid requires oiling now and then, to prevent it sticking; and, if not kept dry, the ammonia is apt to deliquesce. I generally renew mine once a month, soaking the box in hot water.

When you return from a day's excursion, turn out your spoils into the Store-bottle, where they may remain until you wish to set them; and if that should not be for months, they will still remain just as you put them in,—as pliant as the day they were caught. If your readers will kindly turn to fig. 140, I will endeavour to explain my mode of setting.

Having pinned your insect to the sheet of cork as described by Mr. Bridgman, first set out the legs (a most important part of the business, as in Hymenoptera they are most conspicuous). The great art of setting is to set naturally. If you have ever observed a fly or a bee walk, you will at once see that the insect represented is in a very unnatural position. The front pair of legs are natural enough. The hind pair should be where the middle pair are; and the middle pair should be exactly in the centre between the first and second pair of wings, if anything slightly inclined forward.

Having arranged this to your satisfaction, take two oblong pieces of cord, and through each end pass a pin. Stretch them so that they are on a level with the wings above the middle pair of legs; then fasten the wings upon them with braces, as in the cut. You will perceive that the only difference is that the legs are under instead of upon the card, as represented. I acknowledge that to do this well, especially in the case of small insects, some trouble must be taken; but when we remember the fact that an insect once set well is worth all the trouble bestowed upon it, and remembering that, if the Store-bottle be used, we may utilize the winter evenings, I think your correspondent Mr. Bridgman will admit that my plan is at least worth a trial. J. P. BLACKETT, JUN.

HERMAPHRODITE FEMALE OF LASIOCAMPA QUERCUS.

AMONG a great number of larvæ of this moth, which I have reared in my breeding-cages this year, one has turned out an hermaphrodite. It is a female, the reproductive organs, however, being but imperfectly developed.

Differing from its sisters of the same brood, it failed to attract any males by "sembling," although favourably exposed for that purpose. The constant occurrence of hermaphrodism among insects is worthy of remark, as it illustrates in a measure, one of the most interesting questions of the day. An hermaphrodite was despised by the ancients as an individual capable of fulfilling by turns the reproductive functions of both sexes, or as one which at the same time possessed both the male and female organs fully developed. Such a condition of things, however, not only does not obtain among the authentic details of anomalies, but is in nature absolutely impossible. The term hermaphrodite is now used to designate an individual possessing an admixture of the two sexes. In all cases the malformed individual being of one or the other sex, and related to the opposite sex by some few characters only.

The origin of this hermaphrodism has been considered somewhat obscure, but it may in most cases be referred to some arrest or excess in the process of development, because, in the early stages of embryonic life, there is found a very close resemblance between the generative organs of both sexes.

Fig. 167. Specimen of Hermaphrodite Female of *Lasiocampa Quercus*.

A great deal of light has been thrown upon the matter both by Haeckel and Darwin, who show that a far greater number of hermaphrodites belong to the female rather than to the male sex, and this fact is explained by the theory that the reproductive organs in both sexes were originally female, and that many hermaphrodites remain of that sex by arrest of development, who would, if further developed, have become males.

CHAS. H. GRIFFITH.

LOCAL NAMES OF PLANTS.

IN the October number a correspondent mentions that "Bazier" is the name given in some parts of Lancashire to the *Auricula*, and suggests that "Bazier" may be a corruption of Base Ear, Sow, or Little Ear.

As *Auricula Ursi* is an old scientific name, and "Oreille d'Ours" is the modern French vernacular name for the Auricula, it can, I think, hardly be doubted that "Bazier" is simply a corruption of "Bear's Ear." These phonetic corruptions, as they may be called, are a fruitful source of local and vernacular plant-names, and are sometimes very amusing and almost always instructive.

At the entrance to Covent Garden are some stalls, at which the humbler members of the horticultural fraternity dispense roots and plants to the owners of London suburban gardens. These good people have some one who prints their labels for them, in a very showy style; but the spelling is occasionally somewhat loose. Once, in passing one of these stalls, I saw a label marked RECKLESS. My curiosity was excited to know what plant bore this vernacular name; and I accordingly asked for a specimen, and found that the label was intended to designate "Auriculas"! Similarly the "*Geum coccineum*" becomes "Scarlet *Gem*." "Potentilla" figures as "Fortune-teller," &c.

One of the most interesting of these phonetic corruptions is the "Primrose." Originally, and properly, the name of the daisy, the old Italian word for which is "la Primaverola," the flower of spring (Primavera); this becomes in French "Primverolles," and first appears amongst us as "the Primrolles," the perversion of which into "Primrose" (meaning, as some instructive schoolbooks tell us, the Prime Rose—the first rose, or flower, of the year) is easily accounted for. In fact, it is an illustration of the way in which many of these phonetic corruptions are brought about. A foreign or scientific name is introduced, which to the uneducated is simply unmeaning; but it happens to bear a similarity in sound to some vernacular word, which has a meaning, and although the meaning word has no conceivable connection with the thing, the *commune vulgus* prefer to use it, rather than one which is to them *vox et prœterea nihil.* Instances are afforded by such words as "Jerusalem Artichokes" (from "Girasole"); "Sparrow-grass" for "Asparagus," as well as the Scarlet Gem and Fortune-teller above referred to, and innumerable others. It is to a similar principle that we may trace the practice of the French of planting a poplar as the "Tree of Liberty"; under the impression that "populus," "le peuplier," means the tree that represents "the people" (populus), and the supporter of the people's rights. I was once very much amused by a fly-driver at Ilfracombe, who knew the whereabouts of all the specialities in the fern way, telling me of a cave where I should find some fine specimens of the "*Serīna*." Not being acquainted with any plant of this name, I betook myself to the cave in question, and there found several fine plants of *Asplenium marinum*, the Sea Spleenwort. So that my friend, or some one who taught him, had by tacking on the tail of the botanical name to the head of the vernacular, made up the not ill-sounding word of "Serina," or "Sea-riner" (I am sure I do not know how he would have spelt it).

I remember in one of the early comic annuals some amusing lines of Hood, describing how a country nurseryman had made a large sum out of the sale of a simple little flower, which he sold under the name of the "Rhodum Sidus." This charming name had proved quite an attraction to the ladies, and the flower had become the rage of the season. At length a pertinacious botanist, who found that the flower was a not uncommon weed (say the *Erythrœa Centaurium*), insists on knowing where the nurseryman got his name from, and elicits the following reply:—

> "I found this flower in the Road beside us,
> So christened it the Rhodum Sidus."

C. B.

SKETCHES IN THE WEST OF IRELAND.

No. 10.—ARAN.

(*Post-Christian Antiquities.*)

THE crosses and pillar-stones next require consideration. The erection of pillars is a very ancient custom, which the Christians adopted; on the pagan pillars cutting crosses, and thus sanctifying them. Subsequently the carved massive crosses, not uncommon in Ireland, seem to have been introduced. The crosses in Aran are varied in character, some being plain, cut on liagān or pillar-stones; others are elaborately carved out of blocks; while some are incised on flat slabs or flags. The large carved crosses have been disgracefully used. Of some only a few pieces can be found, and all are broken. The accompanying figures (figs. 168, 169, and 170) represent some common West of Ireland forms of crosses observed in different places, cut in or raised on monumental slabs or pillars. Fig. No. 169 is the form of the cross that usually was inscribed by the bishop while consecrating a building for sacred purposes. It has been called by the late G. V. du Noyer, M.R.I.A., "The Cross of the Redemption," because, as he pointed out, it is a rude representation of the Holy Ghost descending in the bodily shape of a dove to light on our Saviour. The typical Irish cross, which is often most elaborately carved, like those at Clommacnoise, Moristenboise (fig. 172), and many other places, is a combination of the Cross of the Redemption with the Cross of the Passion. In pagan times the Irish had their Tiodh Neimheadh, or sacred groves, to which criminals fled for refuge: these were marked by liagān. The early Christians adopted many of the pagan temples and other sacred places, and, among others, the sacred groves, which by them were called "Tearmons"; crosses being inscribed on the liagān, which they afterwards called "Terminal crosses" (fig. 171). Such a tearmon seems to have existed at Monasterkieran, on Aranmore, and is thus described by Kilbride:—"Four tall pillar-stones formerly surrounded the buildings. One now stands within a few paces of the south-east gable of the church, another in a wall a few feet west of the church, while the other two have been dug up, and now lie in an adjoining field. These two, and probably all four, have been removed from their original sites. Each pillar is about five feet long and a foot in breadth. The usual cross cut on these pillars is two circles about a foot apart, with horizontal lines drawn through the centres of the circles; also a vertical line. Such crosses, in some cases, are fringed with tracery, and present a handsome appearance. The cross near the gable of the church has a hole of more than an inch in diameter pierced through it (fig. 171). Such holes are looked upon as a mark peculiar to the pillar-stones used in pagan times for the double purpose of commemorating the dead and also as objects of worship, while after the introduction of Christianity they were adapted for religious use, and appropriated to its service by the cross being incised on them." This kind of pillar is called Clogh-a-poul, or hole-stone.

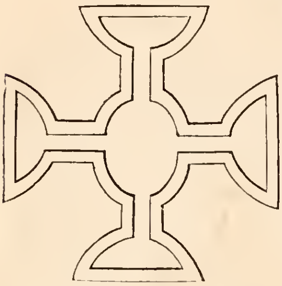

Fig. 168. Common Irish Cross.

Some of the churches and their appendages were inclosed within massive walls, or cashels, evidently for the purpose of defence. These are very similar in construction, and evidently were built after the pagan cashels. Caiseal (pronounced cashel) is derived from the same root as caisiollacht, the round rim of a pot or caldron, and originally was applied only to a round inclosing stone wall or fortification, although subsequently it was sometimes applied to the more modern square castles.

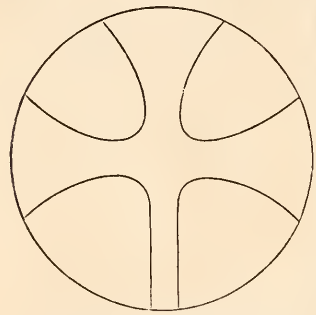

Fig. 169. Cross inscribed by Bishop when consecrating a church.

Each ecclesiastical cashel contained within its wall churches, a well, and habitations; the latter seem to have been wall-cells, cloghān, and luscas. The wall-chambers are commonly found in cashels that were built on the solid rock: they are very common in the cashels in the counties Kerry and Galway. They were constructed in the thickness of the wall, may be of any length, from five to seven or eight feet wide, and usually are four and a half or five feet high. The cloghāns have been described previously. A lusca, or lusk, is a cave, crypt, or subterranean habitation, and is explained by O'Cleary, "Teach talmhan," a house in the earth. Some lusks are simply caves, scooped out in drift or such-like accumulations; others evidently were excavations in which habitations were built, which afterwards were covered up with clay. Some of them are most ingeniously constructed, and hereafter will be more fully described. In some cashels stones to build the surrounding wall seem to have been quarried in their interior, the hollow afterwards being turned into lusks. In Aran there are structures partaking of both the nature of lusks and cloghāns, as they are partly below ground like a lusk, but are roofed like the latter. The post-Christian cashels had massive stone doorways that have been mistaken for cromleacs when the adjoining wall was removed. One of these detached doorways has already been figured in Chapter V. (fig. 52). Other habitations were the lauras and cœnobiums: some of the lauras were inside cashels. Petrie, while writing of the antiquities on Aranmore, describes a laura as a building containing many cells divided from each other, where every monk provided for himself, and led a solitary life under the authority of a bishop or abbot; while a cœnobium was a house in which the monks dwelt, lived, and ate together, all being provided for from a common purse.

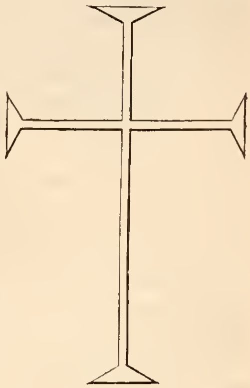

Fig. 170. Common form of Irish Cross.

Of the three islands Aranmore was the great place for the saints, it is teeming with the ruins of ecclesiastical structures and other objects that perpetuate their memory, while on the other islands fewer are met with. On Inisheer, or the south island, is St. Gobuet's church, a small cyclopean structure; and St. Caomhain's, or Cavan's church, which is nearly imbedded in the sand. The latter is supposed to be a twelfth-century church, and is divided into a nave and chancel by a beautiful arch. Immediately north of the church is the saint's tomb, now called Labbacaomhain, which is supposed to be very effective in curing the sick, who visit it in great numbers on his day, which formerly was the 3rd of November, but it is now changed to the 14th of June. The saint died A.D. 865. There are also the ahala of the daughters; Cloghānavillaun; and Cloghān Eany, or St. Eude's house.

On the middle island are three churches, an aharla, and a holy well. One of the churches is called Teampull Seachtmicrigh, or the church of the seven sons of a king; and a second Teampull Crannanach, or Kenanack's church. It is after this saint, whose original name was Gregory, that Gregory's Sound is called. This church is a very complete little structure, and is thus described by Petrie:—"This little church—which would be in perfect preservation if its stone roof remained—measures on the inside but 16 ft. 6 in. in length and 12 ft. 6 in. in breadth; and its walls, which are 3 ft. in thickness, are built in a style quite cyclopean, the stones being throughout of great size, and one of them not less than 18 ft. in length, which is the entire external breadth of the church, and 3 ft. in thickness."

On this island may be mentioned, the kitchen middens in various places, usually at the old ecclesiastical settlements; also a cave, said to have been inhabited till recently, the last occupants being some of the Patriots, who, after their defeat, fled to Aran to escape the butchery that was going on in Ireland, at the dawn of the present century.

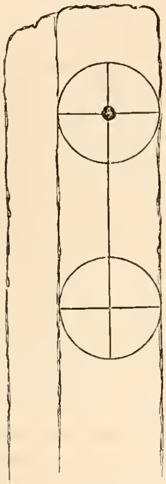

Fig. 171. Terminal Cross or Tearmon.

On Aranmore, the village now called Killeany, was the first Christian settlement, St. Eude, the apostle of the island, having resided here and founded Teampullmore and a monastery. These are now gone, having been carried away by the Cromwellians to build the fortress of Arkin. Here it may be mentioned, that St. Eude is supposed to have come across from the opposite coast of Connemara on a large flat granite block. This stone is shown at a small bay on the south-east coast, and called Cloghnacurrach, or the stone boat. At Killeany there is the butt of a round tower; fifty years ago this is said to have been 40 ft. high. From the style of the building, the tower would appear to have been much more modern than many of the churches on the islands, which is very probable, as many, if not all, the round towers in Mayo and Galway were built about the tenth or eleventh century, that of Annaghdown, on Lough Corrib—the site of which only remains on the strand near the church — according to Petrie, having been erected A.D. 1238. Besides the round tower, there are two blessed wells, various ruins, and the pedestal of a very large cross, of which now only one broken fragment remains. To the south of Killeany, at the church called Teaglacheinne, St. Eude and one hundred and twenty other saints, are said to be buried. This church, probably, was not erected till the thirteenth or fourteenth century, judging from the style of the building. It is now nearly buried in sand, and the saint's tomb cannot be seen unless you excavate. On it is an inscription in very ancient letters.

The present capital of the island is Killronan. Here there was formerly a church dedicated to St. Ronan; now, however, there is only the aharla previously described. Near this village is Ballcearna, or St. Clama's House. Here existed her church, liagān, and well. The latter is the largest spring in the island, and its waters are said to be incapable of being boiled, or of boiling anything.

Monasterkeiran lies more than a mile north-north-east of Killronan, and is the best preserved church in the islands. The present structure was built in the fifteenth century, on the site of a more ancient church. In its vicinity are the ruins of various buildings, while its tearmons, with the terminal crosses, have been previously described. There is also a bullān and a holy well, the latter in a cyclopean cell.

Fig. 172. Typical Irish Cross at Clommacnoise.

Teampull Soorney, or St. Serenus's church, is situated about a quarter of a mile north-west of Monasterkieran. Here are the remains of a church that seems to be the oldest on the islands; Tobersoorney, a bullān cut in the solid rock, into which the water is conducted by a minute channel; and close to the latter a circular inclosure that seems to be an aharla, in which a rude pillar cross stands. To the north of this inclosure is the foundation of a structure in the corner of which is a handsome bullān cut in a large block of granite. Kilbride supposed this to be the ruins of the church called in Colgan's list Kilnamanach, or the Church of the Monks, dedicated to St. Caradoc Garbh (the rough). Farther westward, in the neighbourhood of the village called Cowrugh, are various ruins, about which very little is known. One church has the remarkable and poetical name of Teampull nag ceatharaluinn, or the "Church of the Four Beautiful Ones"; near it is their grave, and a well dedicated to them. We may also call attention to two bullāns, two liagān, several cloghāns, a cashel, a laura; also the village of Ballynaseau, previously described, as it is supposed to be in part pre-Christian.

Kilmurvy, farther west, signifies "the church on the sand." Such a church does not now exist, if it is not buried. At or near the village are Teampull-macduagh; Teampullnaneeve or Teampullbeag, as it is known by both names; and a third, the name of which is forgotten; a holy well, a tall stone cross, and the site of a fifteenth-century monastery, onee famous as a seat of learning. The first of these churches lies inside a cyclopean fort or cashel.

Farther north-west, near the north shore of the island, is the village of Onaght, but known to and called by the Aranites, as Bally-na-scacht-teampull, or the village of the seven churches. Here there are now only two churches, Teampullanphoill, or the church of the hole, and Teampullbrecan; but there are the sites of numerous buildings, some of which may be the remains of the churches after which the place is called. Teampullbrecan was called after the founder of the settlement, and his grove is shown, marked by a cross cut in a flag. There are also two elaborately carved stone crosses that have been broken up; the pieces, however, some years ago were collected by Sir W. Wilde and S. Ferguson, M.R.I.A., and it is to be hoped by this time they are restored as far as practicable. Near the church is a holy well; also a labba, the latter said to cure sterility in the human race.

As a conclusion to this brief sketch of the antiquities of Aran, attention may be drawn to the rich field of ancient lore which lies here unworked. There is the limestone cave on the middle island, which probably contains relics of the pre-historic man; the buried habitations and other structures; the dirt-heaps or kitchen middens at the Pagan and ancient Christian habitations; also the artificial mounds, about which nothing is known, which may be either cnocāns or tuiams.

G. H. Kinahan.

"The eggs of the Garden Slug (*A. hortensis*) are phosphorescent for about a fortnight after they have been deposited, and may be seen in the evening on moist hedge-banks, giving out a pale light."—*Harting's Rambles in Search of Shells.*

MICROSCOPY.

Useful Slides.—Like, I dare say, many of the younger readers of Science-Gossip, and students of microscopy, I have to exercise considerable economy, and mount my own objects; naturally I am desirous of stocking my cabinet with really useful and instructive slides, and, as the winter season approaches, and students have more leisure at their disposal, I venture to take up a little of your room, and make an appeal to your readers for assistance, trusting that out of their experience they may be able to advise and instruct not only myself, but others who likewise are young students in this absorbing pursuit. My first difficulty is with whole insects, which are so necessary to study. With some specimens from the Coleoptera, the Diptera, and Hymenoptera, I think I may say I have been fairly successful; but with many specimens from the last-named two orders I have failed, the delicacy of the wings, and the extreme hardness of the chitine of the head and thorax, being the stumbling-blocks in my progress: thus, long before the thorax is sufficiently soft to admit of flattening out, the wings have been acted upon so strongly by the liquor potassæ, that the two membranes separate, and tear under the most delicate manipulation which I can bring to bear upon them. Doubtless many of your readers have encountered and triumphed over this difficulty; and I trust that they will favour me with full particulars of their method. Perhaps because I am a very young student I sympathize strongly with those microscopists who go in for pretty objects, even though, as in the case of many seeds and diatoms, no real knowledge can be obtained from such objects. We see so many things in the moral world made ugly and distorted by crime and folly; we see so much of misuse in the natural world, resulting in that which is offensive to the eye and painful to the mind, that we may surely be allowed the luxury of observing that which is pleasing in art and nature. Though we concede so much, it is undeniable that objects must be beautiful to the mind as well as to the eye, and to be this their structure and also their adaptability to the place in nature which they fill, must be clearly manifested, and therefore the cabinet of every microscopist should contain numerous slides of sections and delicate dissections of entomological objects. I have long desired to possess slides of antennæ which would clearly show the nerves, and have tried (once only) the bleaching preparation recommended by Dr. Hicks (see the article in the February number of Science-Gossip for 1874), but without the least result as regarded the manifestation of the nerves. Have any of the readers of Science-Gossip made the experiment, and with what result? Many learned writers have spoken of these nerves as objects easily observable in well prepared antennæ, but it is rather remarkable that although my friend, Mr. J. S. Harrison, of this port, has placed his large and valuable collection of slides (containing specimens by all the best mounters of the day) at my disposal, I never have been able to make out those nerves; and I consider it more remarkable still that I have never met a microscopist who has seen them. My own private impression is that writers or observers sometimes draw upon their imagination, and describe what they would like to see, on the same principle that engravers depict objects in a state of perfection which cannot be attained to in mounting. I believe I have somewhere in SCIENCE-GOSSIP seen passing reference made to preparations of the nervous systems of insects. If such preparations are practicable, then no microscopist can rest satisfied until he possesses them, and I shall esteem some information on this point most valuable; as also on the preparation of small entomological specimens in such a manner as to reveal the internal structure. As an example of what I mean I may say that I read an article on the brain of *Pediculus capitis*, written after the close observation of a whole specimen stained and mounted in balsam by Topping, and I at once began to strongly desire such an addition to my collection. Lastly, if we would attain to a truly practical knowledge of micro-entomology we must have carefully-prepared sections of the heads, eyes, antennæ, and other parts of insects, and I have been satisfied by ocular demonstration that such preparations have been most successfully made, chromic acid being, I believe, the hardening agent. I am entirely ignorant of this process, but am most desirous to have it fully explained to me, and have good reason to hope that many of your readers will give me the benefit of their experience, should they possess sufficient patience to wade through the long narration of my requirements. I have, of course, in my remarks, been addressing myself to micro-entomologists only. —*E. Lamplough, Hull.*

VARNISH FOR MICROSCOPICAL CELLS.—Could any of your correspondents give me a receipt for white varnish for ringing cells? Also, I should be glad to know of any coloured varnishes suitable,—rose or lake. I have tried sealing-wax varnish.—*W. G. C.*

GLYCERINE MOUNTING.—In his statement as to a mixture of gold-size with white lead, &c., being a good cement for confining glycerine, "F. K." has ignored Dr. Carpenter's advice that varnishes for such purposes should never contain any solid particles, as sooner or later they become porous (see his work on the Microscope, 5th edition, p. 236). I have found amber dissolved in chloroform to be a very good varnish for just keeping the glycerine within bounds, as it dries almost instantly. Then I apply a coating of gold-size or shell-lac varnish, not to extend more than possible beyond the junction of the cell and cover. When quite dry, wash off any glycerine by a gentle stream of water, and then varnish with plain gold-size, and finally with some mixed with crocus of iron.—*J. R. T.*

INTERFERENCE OF LIGHT.—I expect J. G. R. Powell will find the obscuration he complains of caused by reflection from the inside of the tube of his microscope. I have often been bothered myself in the same way when using a deep eyepiece. I don't see how to avoid it whenever a short eyepiece is substituted for a longer one, so long as eyepieces are of the present construction.

THE MICROSCOPICAL STRUCTURE OF LYCOPODIUM SPORULES IN RELATION TO THEIR PHARMACEUTIC AND THERAPEUTIC VALUE.—This was the title of a paper recently read before the Homœopathic Pharmaceutical Association. The author said the appearance of the fine dusty sporules of Lycopodium in mass is well known to all pharmacists, being extensively used as a harmless covering for pills, also as a puff powder on account of its extreme fineness; and on the Continent not unfrequently as a producer of artificial fire, from the quality it possesses of flaring up when ignited. "It has often struck me as a very anomalous and unexplained fact that the remedial virtues of the Lycopodium sporules should be ignored by the dominant school of medicine, while by the smaller body of Homœopathic practitioners, Lycopodium has from the commencement proved one of their most cherished remedies. It was with a wish to solve if possible this incongruity that I have recently made a series of experiments with the aid of the microscope. A crude examination of Lycopodium in the microscope, with a one-inch objective, shows it to be composed of an infinitesimal number of minute hard straw-coloured particles, each about $\frac{1}{800}$th of an inch in diameter. Upon applying a quarter or one-fifth objective, these little particles will be seen to possess a definite regular form, each particle being a hard nut, rounded on one side, converging in triangular lines, with flattened sides, to an apex on the other side, and the whole surface covered with rounded knobs. After pounding a small portion for a considerable time in a Wedgewood mortar, examination showed the nuts not to be perceptibly altered or fractured; but on repeating the process with a very minute quantity of the sporules in an agate mortar and pestle, many of the nuts were found to be completely fractured and their contents dispersed. Conjecturing that the contents of the nut, whatever its nature, contained the vital medicinal element of the Lycopodium, the broken sporules, with the addition of a drop of water, were put under the microscope, when a large number of unmistakable oil-globules were at once visible. A similar experiment to the last was next made, but with the addition of ether to the ground sporules in place of water, the result being, as anticipated, that no oil-globules were visible, being absorbed by the ether. These experiments seem to prove conclusively that as in the case of many seeds, the hard-cased sporules of the Lycopodium are filled with a peculiar oil. If, then, as surmised, it is to the action of this oil upon the system that the medicinal virtues of Lycopodium are to be ascribed, the apparent inconsistency respecting it between the two systems of medicine is at ouce explained—the nutty sporules as administered in their unaltered form by the adherents of the old school, probably passing through the system without any assimilation having taken place; while, on the other hand, the Homœopaths have by trituration aud subsequent attenuation extracted the oil, and administered it in a form easily assimilable with the tissues of the body. Having investigated thus far the true physical nature of the remedy, there remains to be determined the best means of most thoroughly extracting this oily matter, and the most suitable menstruum and form for its preparation and administration. To this end six months ago I prepared a series of mixtures (which are on the table before you) of the following fluids with a given quantity of the Lycopodium sporules, viz., alcohol (absolute, rectified, 20 O.P., and proof), distilled water, glycerine, and ether, and heated each (the glycerine solution excepted) to boiling-point for a few minutes. Upon then examining them under the microscope, no alteration in the form of the sporules was perceptible in any of the solutions, and now, after six months, I think you will see, that with the siugle exception of the ethereal preparation, in which a large proportion of the sporules are swelled out and broken, none of the solutions appear to have produced any visible change in the appearance of the sporules." Mr. Thompson here exhibited the different solutions, showing a drop of each under the microscope (one-fifth objective), confirming the above statement. "As all of you are aware, the 'British Homœopathic Pharmacopœia' recommends that Lycopodium should be prepared in trituration; and, no doubt, the good results accruing from Lycopodium (so frequently administered in the higher attenuations) are owing to the long-continued triturating process of the hard sugar crystals upon the shells of the sporules, fracturing mauy of them, the milk sugar absorbing the contents. But I was not a little surprised to find, on microscopically examining the lower triturations, how few comparatively of the sporules were broken, the greater number of them having escaped fracture altogether, lying about among the sugar crystals quite uninjured. The 1× trituration was then exhibited in a drop of water under the microscope, showing the entire sporules lying about amongst the sugar-of-milk crystals. The first centesimal trituration did not yield very much more satisfactory results; for, upon examining a little of it in a drop of water with the one-fifth objective as before, the separate sporules were still seen in many cases clustered together in small masses, a large number not being at all injured. In examining the second and third centesimal triturations, however, it was found that the triturating process had thoroughly succeeded, for all the sporules appeared to be completely broken, and numbers of oil-globules were floating about in the water. These experiments upon the triturations of Lycopodium were entirely confirmed by examining samples of the same triturations procured from other Homœopathic chemists, all yielding precisely similar results. Subsequently, I have been at some pains to practically ascertain if it be possible to prepare a *proper* 1× trituration of Lycopodium. It is not to be attained by making it according to the allotted time in the Pharmacopœia; but I find that if a small quantity (not more than 500 grains) be very well triturated for two hours, the 1× trituration so prepared will, on microscopic examination with the one-fifth objective, show all the sporules to be thoroughly crushed. The first centesimal and higher triturations made up from this will be found to be intimately mixed, and minute subdivision completely accomplished. It thus becomes evident that a very considerable amount of trituration is essential in order to thoroughly break the outer cuticle of the Lycopodium sporules, and so to free the inside contents; the trituration form, therefore, certainly appears to be the best method of preparing and administering the drug in its lower attenuations. If made at all as a strong tincture, the previous experiments conclusively show that ether, and not alcohol, should be the vehicle used. In this series of experiments I have merely endeavoured to make good a theory that will reconcile opposite statements respecting the therapeutic value of a particular substance. In so doing I would not be so presumptuous as to say that in no case will the Lycopodium sporules, if taken in their ordinary form, affect the system either curatively or otherwise. This lies within the province of the medical practitioner to determine, and exactly opposite statements on the point have been made."

ZOOLOGY.

Spawn of Frogs and Toads.—In the last number of Science-Gossip, a correspondent, "G. S.," in his paper on the "Spawn of Frogs and Toads," asks—"Whether the eggs of the water lizard, or newt, are laid at differeut times"; to which I answer, "They are so laid." Having had the smooth newt in a small aquarium the last three years, I have had the eggs just laid, and the young from previously-laid eggs more than a month old at the same time, with others of all intermediate ages. I beg to refer "G. S." to a paper on the subject in SCIENCE-GOSSIP, vol. for 1874, p. 104, where the manner of laying the egg is described. I think "G. S." is quite right about the tails of tadpoles being absorbed, and not thrown off. I have had both toads and frogs under observation, and have always seen the tails gradually dimiuish until quite gone, but never saw one thrown off. I have witnessed the development of both frog and newt from the egg, of which I have sketches by me taken at the time. The frog tadpole was free from the egg in about five days; the tadpole of the newt was free from the egg in about twenty-four days after it was laid. The development of the frog is very rapid.—*J. Fullagar, Canterbury.*

THE POPE OR RUFFE (*Perca cernua*).—In auswer to the question by Mr. Thomas C. Oborn, in the last number of SCIENCE-GOSSIP, the pope is a fish of the Perch family, and therefore a predacious species. It is fond of worms and other animal food; and unless well supplied therewith is not likely to be, while alive, a very quiet tenant of an aquarium. The pope may be kept very well, if properly fed, in an aquarium, the food being appropriate, but by no means too abundant. Probably Mr. Oborn's popes died from want of any proper food.

ENGLISH HUMBLE-BEES IN NEW ZEALAND.—Two nests of English humble-bees have just been sent to New Zealand, by Mr. Frank Buckland, for the Canterbury Acclimatization Society. These insects are specially desired in New Zealand for the purpose of fertilizing the common clover; the proboscis of the common bee is not sufficiently long to reach down to the pollen of the clover flower, while the humble-bee is enabled to do so. In this way the insect is expected to do great service to the agriculturist by largely extending the growth of the clover. Such a practical application of "Darwinism" never occurred before! The bees were packed in their own nests in two boxes, and will be under the charge of a member of the New Zealand Council, who is provided with every necessary for their welfare during the voyage. They are expected to arrive about the middle of January—midsummer at the antipodes.

CAMBERWELL BEAUTY.—A fine specimen of this rare butterfly was caught at Aldborough, in Suffolk, during the last week in October.

POPULAR SCIENCE LECTURES.—We are glad to draw attention to a very ingenious Dissolving View lantern which has been recently invented by Mr. W. C. Hughes, optician, of 151, Hoxton-street, N., and which will be found highly useful in illustrating popular science lectures, whilst its easy manipulation makes it exceedingly valuable to extemporaneous speakers. Adjuncts such as these are undoubtedly useful in advancing the dissemination of scientific knowledge.

CONVOLVULUS HAWK-MOTH.—In the November number of SCIENCE-GOSSIP allusion is made to the plentiful occurrence this season of *Sphinx convolvuli.* I know of as many as ten having been got; six were caught by collectors, and the other four were picked up in the streets by different persons.—*R. H. F., Aberdeen.*

WHITE BEES.—The instiuct of the hive bee teaches it not to permit the population of the hive to increase to an inheritance of starvation; and thus, when continuous bad weather forbids honey-gathering, the workers destroy and throw out of the hive the helpless, immature young, which in both larvæ and pupa state are white. These are sometimes expelled by thousands, even although the stores of the colony are far from exhausted. The steady in-come of honey *stimulates breeding*, and this is taken advantage of by the scientific apiarian in the early spring, who, by gently and continuously feeding his bees before nature affords a supply, has the satisfaction of finding the population of his hives rapidly increasing, and ready to take the utmost advantage of the bountiful yield from the fruit blossoms which an all-wise Providence provides. But woe betide the negligent or forgetful beekeeper; for if this artificial supply be intermitted for a few days, and nothing comes in from the woods and fields, the bees permit no "*bouches inutiles,*" and the massacre commences. This state of things has been particularly apparent during the last summer and autumn, and before the May flowers make their appearance again nine-tenths of the stocks of bees throughout the length and breadth of England will be found to have perished. Although a labouring man will feed his pigs, he rarely feeds his bees, and, when he does, he gives an ounce where he should a pound.—*John Hunter, Eaton Rise, Ealing.*

CONVOLVULUS HAWK-MOTH (p. 259).—At the October meeting of the Watford Natural History Society, Mr. Arthur Cottam read a "Note on the Appearance of *Sphinx convolvuli,*" in which he mentioned that several specimens of this moth had recently been taken in the neighbourhood of Watford. Two were taken by a postman, who, when delivering the letters in the morning, found them on door-knockers.—*J. H.*

A GIGANTIC HYDROZOAN.—Professor Allman has forwarded to *Nature* an account he has received from Professor Wyville Thomson, of a large gymnoplastic hydroid recently obtained by the *Challenger* in the North Pacific, lat. 34° 37′ N., long. 140° 32′ E., at a depth of 1,875 fathoms, or more than two miles. This zoophyte is of such colossal dimensions that the largest form hitherto known sinks in comparison with it into utter insignificance. In one specimen the Hydranth was 9 in. across. Whilst the Hydrocaulus was 7 ft. 4 in. high. A short time afterwards, during another dredging at a depth of 2,900 fathoms, another specimen was brought, of equal proportions. The length of the tentacles was about 4 in., and they were of a transparent pink colour.

SPHINX CONVOLVULI.—I have captured several fine specimens of *Sphinx convolvuli* this season at Ore, near Hastings. They were all taken at one bush of honeysuckle. The greatest numbers I captured in one evening were seven and five; at another time I took two at one stroke of my net. Having more than I require, I shall have some to offer in exchange as soon as they are off my setting-boards.—*William Low Sarjeant.*

ASTINOMUS ÆDILIS IN CARDIFF.—On the 29th of November I had the good fortune to take a fine male of this beetle upon a lady's dress in a tram-car.—*T. L. Howe, Cardiff.*

BOTANY.

RAPHIDES OF ASPARAGUS.—Mr. Glasspoole's histories of our cultivated vegetables are so valuable as to make us wish that he would increase their interest by some account of their internal structure. Thus, in his last paper, he might have told us that the asparagus abounds in raphides; and that they form beautiful microscopic objects, whether examined in the fresh plant or in cooked fragments of it from the table. The raphides are so beautiful and easily examined as to afford a pleasant microscopic amusement after dinner. And full instructions, with many illustrative engravings, are given about Raphides, Sphæraphides, and Crystal Prisms, in SCIENCE-GOSSIP for May, 1873.

CLADIUM MARISCUS.—One of the finest of our *Cyperaceæ* is the Fen Sedge. It is in several respects a remarkable plant, and one not easily overlooked. Can any correspondent kindly inform me as to its distribution in the southern counties?—*F. H. Arnold.*

EUONYMUS (SPINDLE-TREE) IN FLOWER. — To the surprise of nurserymen and others in Brighton, this shrub (both the narrow and the broad varieties) was in two or three situations in flower, one in great profusion, at the beginning of August. As an ornamental shrub it has been cultivated here for many years, and thousands upon thousands may at all times be seen. On the 11th of October I found it in fruit; the capsule, the size of a small pea, was perfectly green, but hard; the arillus, lapping the seed, was orange-coloured: the season was, no doubt, too far advanced for the seeds to ripen, as they might have done in other parts of England where the climate is warmer and milder. I hope cultivators and others will give any information in their power, both as to the flowering and the ripening of the fruit; and whether the fruit has the ornamental appearance of our common spindle-tree, *Euonymus Europæus.—T. B. W., Brighton.*

MALVA BOREALIS.—In last month's number of SCIENCE-GOSSIP is a notice of the discovery of *Malva borealis* on the Sussex coast, and I hear it was found between Boxhill and St. Leonard's. As I am particularly interested in the flora of the district which includes that portion of the coast, I should be very much obliged if you could ascertain from your correspondent C. H. O., the exact locality in which it was found; and still more so if you could procure for me even a small specimen to add to my herbarium of East Sussex plants.—*J. W. Roper.*

COCO, COCOA, OR CACAO: WHICH IS WHICH?—I had occasion lately to have some dealings with a firm of English manufacturers of coir (fibre) matting. They described it, however, in all their invoices and other printed documents as "Cocoa matting." In correspondence I took the opportunity of suggesting that "Coir matting" would be a better designation—less objectionable in every way—than "Cocoa." Their defence was well founded, so long as the same confusion of terms—which should properly be restricted to very different substances, from very different sources—is used in our most important works of reference. "Coir" is the fibre of the husk of the "Coco-nut," the fruit of the *Cocos nucifera*, a palm-tree of the natural order *Palmaceæ*. The term "Cocoa" has no proper meaning or application to this tree or any of its products. On the other hand, "Cocoa" is obviously a popular English corruption of the South American word "Cacao," than which it is certainly softer or more euphonious. The name "Cacao" is applied by the South American Indians both to the bean and to the produce of the bean, of the *Theobroma cacao*, a tree of the natural order *Byttriaceæ*. To this tree, or its produce, the words "coir" and "coco" have no proper reference. But, in "Chambers's Encyclopædia" (1st edition, vol. iii. 1862), *Theobroma cacao* and its products are described under the heading "Cocoa, Cacao, or Coco"; *Cocos nucifera* and its products under that of the "Cocoa-nut or Coconut"; and the husk-fibre of the latter as "Coir, or Cocoa-nut fibre." Now it seems hopeless to prevail on Englishmen to give up the use of the term "Cocoa" in favour of "Cacao." But the absurdity of using the word "Cocoa" in reference to matting made of the fibre of the nut of *Cocos nucifera* might easily be avoided if only manufacturers would stick to the synonymous and appropriate term "Coir."—*W. Lauder Lindsay.*

GEOLOGY.

SEDIMENTARY BASALT (DOLERYTE).—In the co. Antrim, between Portrush and the Giant's Causeway, there is a series of thin-bedded dolerytes under the great massive sheets. These beds have all the appearance as if they were originally sedimentary rocks. I however do not believe that they are now in their normal condition, but that originally they were basic tuffs or tuffose rocks; that is, they were either ejected as tuff, and afterwards sorted and arranged by water, or they were made up of the detritus of disintegrated doleryte, and were arranged by water in their present bedded condition; while subsequently they were invaded and altered by the same metamorphic action as that which metamorphosed the Lias rocks at Portrush. It seems impossible these rocks can be normal dolerytes, as no outburst of igneous rocks, no matter how fluid, could form such widespread, thin, and even sheets; neither is it likely that their present bedded appearance is due to a system of horizontal jointing. Furthermore, we know that metamorphism has changed felsitic tuffs and tuffose rocks into a rock undistinguishable from felstone; therefore it is probable that the same action is capable of changing basic tuffs into rocks undistinguishable from doleryte. If this is the case, we have a doleryte (not normal however) that originally was a sedimentary rock.—*G. H. Kinahan.*

FOSSILS NEAR WATFORD (p. 263).—The chalk-pit in Berry Wood, Aldenham, about which "W. H. G." inquires, is still accessible, but I fear the geologist who visited it in expectation of finding it "abounding in well-preserved fossils of various kinds" would be disappointed. The fossils referred to are preserved in the cavities of flints, and are mostly microscopic; and their abundance is merely due to these hollow flints being more frequently met with here than in other places where the chalk is exposed in the neighbourhood of Watford. The heaps of chalk from the new tunnel will be found better worth searching for fossils.—*J. H., Hon. Sec. Watford History Nat. Society.*

NOTES AND QUERIES.

WHITE WOODCOCKS.—Was the bird mentioned by Mr. Wolstenholme a pure white or a yellowish white (pale-fawn colour)?—as yellowish white woodcock and snipe are not so very rare in Ireland, a good collection being in the museum of the Royal Dublin Society.

THE SIXTH CENTURY IRISH CHURCHES AND THE ARK OF THE COVENANT.—To me it always seemed likely that the early Irish churches were copied from the Ark of the Covenant, on which account I have made inquiries from different persons learned in our old Irish annals, if they could give me information on the subject, but always unsuccessfully. I would therefore be greatly obliged to "C. A. O." if he would put me in the way of getting *authentic* information about this early immigration of Jews to Ireland. There are records of various immigrations to Ireland given by the different English writers on Ireland and the Irish; but unfortunately most, if not all of these, are imaginary, and will not bear investigation. On this account any statement of the kind should be carefully examined into. I hope there are good proofs of a Jewish immigration, as it would be most interesting to know the origin of these handle-like projections from some of the churches.—*The Writer of "Sketches in the West of Ireland."*

"CRABS OUT OF WATER."—I notice that in last month's GOSSIP there is a paragraph on "Crabs out of Water." A curious instance of how long crabs can live out of water came under my notice a short time ago. A fisherman having to remove his hut, which stood about a hundred yards from high-water mark, discovered hidden beneath the flooring and the beach a crab (*Carcinus mœnas*) in what appeared to be a very healthy state, for it made off at a most rapid pace to an adjoining building. On inquiring I found that none of the fishermen had been out crab-fishing for three weeks. It would, therefore, seem as though this crab had either lived beneath this hut for so long, or that it must have found its way there after having been thrown up by a storm. I ought to state that under the hut there was a quantity of damp seaweed, &c., which might have supplied it with the necessary quantity of moisture for its gills.—*C. P. O.*

ON THE TADPOLES OF NEWTS, &C.—Your correspondent "G. S.," in the November number of SCIENCE-GOSSIP, says that he has never reared the tadpoles of newts. As I have done so, I write these remarks for the benefit of "G. S.," and any one else who chooses to read them. I one day set out, armed with a pickle-bottle and net, to a pond where I had seen some (as I thought) frog tadpoles just hatching out from the spawn; but these afterwards turned out to be the tadpoles of the *Triton aquaticus*, the common smooth newt, or ăskĕl, as it is called in Shropshire. They were slippery little animals, and eluded my grasp as if they were oiled; however I procured some at last, and secured them in the bottle. When I got home I put them into my aquarium, where, by swimming about in a very lively manner, they soon attracted the notice of puss, who managed somehow or other to catch one or two and gobble them up. In less than a week there appeared two small tubercles, one on each side of the neck (or, at least, where the neck ought to be, for it was hard to say where the head ended). These grew very soon into a pair of *front* legs, which were followed, about a fortnight afterwards, by the appearance of the back legs. Up to this time the tadpoles possessed external gills, consisting of three branchial processes on each side of the head. These were visible to the beginning of September, and were gradually absorbed into the animal, but were *not dropped off*. The Rev. J. G. Wood says that the newt always wraps its spawn in the leaf of some water-plant. Now, this is certainly not always the case, as I have frequently found the spawn in the ground under water, partly covered with clay, but peeping out here and there from its covering. I have reared both frogs and toads, also, from the spawn; and I think that the following are the points of difference between the spawn and tadpoles of the Frog, Toad, and Newt. *Spawn:*—The spawn of the frog is disposed in irregular masses generally under water. The spawn of the toad is disposed in regular strings under water. The spawn of the newt is disposed in small lumps, sometimes separately, and is generally covered with earth (or leaves?). *Tadpoles:*—The tadpole of the newt has gills, and a tail during part of its life, and develops its hind legs first. The tadpole of the toad resembles the former, but never possesses gills. The tadpole of the newt has a tail permanently, gills during part of its life, and develops its front legs first.—*H. E. F.*

WARTY NEWTS.—I have made newts and diving water-spiders subjects of special observation among other inmates of the aquarium. In May, 1873, I obtained a number of warty newts from a pond near Northampton, and decided to try the practicabilty of keeping newts through the winter with great success. After the stock, owing to some being given away and others escaping (none died), had been reduced to three in October, I placed these in a large bell-glass with two inches of water covering a bottom of sand. A large island of stones, surmounted by a sod of grass, occupied the centre. The newts continued taking very rare baths till the middle of November, and eating occasionally a lively worm. As there was a fire in the room, I suppose they delayed their hybernation. From November till the end of February they lay apparently torpid under the stones, taking no food, and moving languidly if touched. They then gradually became more lively, and were often found lying under water, and occasionally took food. A very slight growth of the dorsal crest was now to be noticed. The newts were all males; and the depth of water was increased to about six inches, leaving still a small island in the centre. These three newts again passed the winter of 1874 in a similar manner, in London; but one died this spring, and another escaped, owing to a heavy shower of rain causing the aquarium to overflow. The one still retained, who now goes by the name of "Billy," shows an attachment, which I should not have expected in such a low order of the animal kingdom. This winter he is spending, with other newts, in a small garden, and I hope will present himself again in the spring. The colony are hybernating under the doorstep. During his aquarium life he always came to the surface to take a worm from my fingers, and, when hungry, would ask for food by swimming up from the bottom. I have often taken him out, and he has made a meal of three worms while walking about my study table in a most fearless manner. I would just add before closing, that the Rev. S. A. Brenan may be quite sure that his newt's tail was eaten off by the sticklebacks—*Experto crede*, and that a newt in fair health will seldom, during its aquatic life, refuse a lively worm.—*F. H. Wood.*

FAUNA AND FLORA OF THE NEW FOREST.—I shall feel greatly obliged to any one who will inform me if there is a book published on the fauna and flora of the New Forest or South Hants; and, if so, the title, date, and price; also, whether there is a natural history society or field club at Ringwood, Christchurch, or Bournemouth.—*E. D. M.*

PUPA OF PRIVET-MOTH.—In your November number for 1874 there is a query regarding the pupa of the Privet Hawkmoth remaining in the same state—still alive—for the whole year: and not having seen any answer, I extract the following from "Westwood":—"The young caterpillars, when first hatched, have the tails remarkably long, the bodies very rugose; but they become smooth at the final moulting. By the end of August or middle of September they are full-grown, and become of a dirty-red colour, when they descend into the earth and change into a dark brown chrysalis. The moth appears the following June or July. *Sometimes*, however, the insect will remain two or even three years in the chrysalis state, and then become winged as perfectly as if it had appeared at the ordinary period."—*C. M. C.*

VERONICA.—By the bye, would any of your readers tell me what is the connection (if any) between the botanical name of the Speedwell and the Saint Veronica who figures in the "Stations of the Cross"?

SPROD, OR SALMON-TROUT.—The Wype, a tidal river in Lancashire, drains that part of the county which lies between the watersheds of the Ribble and Lune, and empties itself in the Irish Sea at Fleetwood. In the summer months great numbers of the salmon-trout ascend this river in order to deposit their spawn in its higher reaches, many of which are caught in their passage, and sold as salmon, being little inferior to that king of fishes; the flesh, however, is not so intense salmon in colour. Within thirty years the fish had no other name in the district than that of "sprod," and is still so designated by the old people. I have examined all works relating to English river-fish within my reach, but have failed to find the name of "sprod." It would be very interesting to me if any of your many readers could give instances where, in other parts of the country the name "sprod" is applied to the salmon-trout. I have an opinion that the word is of Danish or Norwegian origin, as there is evidence that this part of the county was formerly an extensive Norse colony.—*James Pearson.*

STRUCK BY LIGHTNING.—I have been much interested in a letter under this title in the number of *Nature* for March 25th, p. 405, and I now send you a similar account, which may interest some of the readers of SCIENCE-GOSSIP. The occurrence to which I refer took place on the 11th of June in the present year at Swefling, near Saxmundham, in Suffolk. In order to render my account intelligible, I must briefly explain the position of the buildings which were simultaneously struck by the lightning. The Church and Rectory are distant about 150 yards from each other; while at a distance of 200 yards from either stands an old-fashioned wooden windmill supported on brick piers. About 12 o'clock on the day I have mentioned I was walking along a road in front of the Rectory with my back to the Church, from which I was distant about 80 yards, when I felt a sudden shock and what seemed a smart stroke across the calves of my legs, with a very loud and sharp report. My first impression was that the lightning had struck me, and also some iron hurdles which were close to my left hand. On turning round I saw at once that the church-tower had been struck by lightning; the weathercock had disappeared, and a jagged portion of the flagstaff alone remained, while the churchyard was filled with a grey smoke or haze. I was not hurt, though for a few seconds feeling a numbness in the calves of my legs. I therefore hastened forward, and on reaching the Rectory was much surprised to find that the lightning had entered the house. The servants declared that a fireball had passed through the kitchen and exploded there. I could not trace the whole course of the lightning within the Rectory, but found it had passed along the bell-wire, blackening the walls where it passed through, and had gone out below the front door, partially displacing a piece or two of stone in the stone steps. On proceeding to the Church, the course of the lightning there was easily traced. After striking the flagstaff it had passed down inside the tower to a point a little above the nave. A small window had been blocked up exactly above the ridge of the roof; through this it had made its exit, the bricks, mortar, and stones being cast very obliquely into the churchyard without injuring the roof of the nave. From this point the electric fluid had apparently passed along externally where the tower and roof of the nave meet, and had then torn off the slates in its progress to the iron water-trough, along which it then passed. At the north-east end of the nave was a buttress; and, at a lower level, along the eaves of the chancel, ran another iron water-trough, the head of the buttress partially intervening. This top of the buttress was entirely torn away, the pieces of stone being scattered around and in some cases cast to long distances. The lightning in its course then passed along this second water-trough, doing no damage except loosening the joints and blowing off the copper elbows, and passed down the upright iron tube to the earth. It did not enter the earth, however, at this point, for it ploughed a shallow horizontal furrow along the ground in the direction of some iron palisading round a tomb, and came out on a level with the upper surface of a gravel walk, where all trace of it was lost. At the same time that the Church and Rectory were struck the Windmill was struck also. The miller was looking out of a window in the opposite direction from the Church when he was struck and for a time lost all consciousness: he was so injured as to be unable to do any work for six weeks afterwards. The shock was severely felt all round the Church and Rectory. A man who was in the stable at the Rectory was so stunned that he had to be led home, but in a short time quite recovered and felt no further ill effects. Another man who was in his garden near the Church told me he was turned quite round. He says the rush of the stones and mortar from the church-tower was a wonderful sight, and that the dust and smoke caused by it was so dense that he thought the Church was on fire. The miller saw nothing of the lightning, nor did I see it. This I attribute to the shock we received. The most remarkable feature of this account seems to be, that the Church, Rectory, and Windmill were all struck by the same flash of lightning. Of this there could be no doubt, as there was only one discharge anywhere near. Previously to this I had not noticed that it was a thunder-cloud at all, and I only observed one flash afterwards, which was evidently at some distance. Bearing on this point, I have it from a very intelligent man, that at the time mentioned he was at a distance of half a mile or more, and saw a flash of lightning descend, which separated when at a distance of about 50 yards from the earth, into three streams. One stream descended straight on the Church, the other two, he should judge, went in about the directions of the Rectory and Windmill. He told me also he had often watched thunderstorms, but he had never seen so vivid a flash. The same remark was made by several persons who were at much greater distances. Another remarkable point is the number of persons who felt a shock. A friend of mine suggests that this was caused by the "return shock." Being highly electrified by the induction of the cloud overhead, we were discharged to the nearest good conductor—in my case, to the iron railings. One more point to which I would call attention is the extraordinary direction in which the stones, &c., were cast from the tower. None of them could have made a greater angle with the face of the tower than from 10° to 15°; they were cast in the direction the lightning was passing, or very nearly parallel with the face of the tower. As I know nothing of the theory of electricity, I cannot give explanations, but I have taken considerable pains to get at the facts.—*E. N. Bloomfield.*

Crickets.—I have lately been studying the *Acheta domestica;* and with reference to the sound made by this insect, although I am unable to show how this is produced, I know that it is *not* made by rubbing the legs against the elytra, or against each other, as some assert, as I have watched the insect closely when it has been "chirping," and have been unable to detect the slightest movement in any part of its body. That the legs did not move in any way I am certain. If there was any motion of the elytra, it was so very slight that I could not perceive it. On the wings there is a formation very much resembling a ladder, running from the base of the wing to the apex. Some observers, I believe, hold that the sound is produced by rubbing this ladder-like portion of the wing against the under side of the elytron. This, however, I think could not be. Firstly, because the wing being longer than the elytron, is folded in such a way as to leave only a part of the ladder (as it were) in contact with the elytron, part being folded under. If (as everything in nature is formed for a special purpose of its own) this ladder had been intended to produce the "song of the cricket," it is natural to suppose that it would be placed in a manner the most advantageous for the performance of that purpose, whereas part being folded under, and not in contact with the elytron, that part would be useless, which is not natural. Further, the construction of the ladder is such that it would only be able to produce sound by being drawn against the elytron vertically. This is impossible, as, if the wings can be moved at all when closed, and covered by the elytra, this cannot move any way but laterally. Clearly then, I think, this particular formation cannot be for such a purpose. Secondly, the structure of the wing is so slight and gauzy, that I do not consider that it could possibly bear the friction. Thus I arrive at the conclusion that the sound of the *Achetas* is not produced by external means. And in support of this view I would refer any one interested in the subject to the formation of the tongue, which is water-lined as it were (like bank-notes). These lines, I imagine, being parallel ridges, and thus eminently calculated, in my opinion, to give a thrilling and vibrating tone to any sound issuing from the mouth of the insect. I shall be glad to correspond with any of "ours" on this subject, and between us we may, perhaps, arrive at some conclusion satisfactory to ourselves at least.—*F. E. Fletcher.*

Banded Beauty.—In answer to "W. E. S.'s" query, which appeared in your September number, regarding the Banded Beauty (*Nyssia zonaria*), I find in "Westwood's British Moths" that "the larva feeds on *Achillea millefolia*, and other herbaceous plants. The perfect insect is found in February, March, and April, and again in June and July, in various situations on the banks of the Mersey, especially near the Black Rock, where it occasionally appears in great numbers, and where it was first discovered in 1829. The chrysalides are buried two or three inches in depth below the surface of the sand, as I am informed by Mr. Gregson, of Liverpool.—*C. M. C.*

Parasites in Caterpillars.—Is it known that other flies beside the Ichneumon deposit their eggs in the bodies of caterpillars, as I have had an instance of such an occurrence this summer? In the autumn of last year I had some caterpillars brought me of the Painted Lady butterfly; one of them I soon observed to be full of larvæ, which I supposed to be that of an ichneumon, and from what I could see of them through the skin of the caterpillar they appeared to be of rather a large size. Having witnessed the development of four different species of ichneumon, I anticipated seeing a fifth. In time I observed they had gone into the chrysalis state within the body of the caterpillar; they were of a reddish-brown colour, and very similar in shape to the chrysalis of the large common house-fly. They remained in this state until the end of June in this year, when there issued from them eight flies, but they were not the common house-fly. Their colour at first sight was very dark, owing to their being covered with long hairs of a deep purple colour; the body below and between those long hairs was covered with a beautiful silver-grey tint; the margin of their eyes and front of the head was covered with the same, which gives the eye the appearance of being set in silver; the legs are also covered with the same silvery tint; the wings are somewhat iridescent; they are not in the least like the Ichneumon. On referring to Westwood on Insects, I find, at page 570, vol. ii., in speaking of the species *Anthornia,* he refers to page 569, fig. 132, 3, 4, 5, and 6, which answers exactly to these produced from the caterpillar; but those, he says, undergo their transformation in rotten vegetable matter, or in manure, excrementa, &c. Perhaps some of the numerous readers of Science-Gossip have seen something of the same sort take place. I have by me the flies, chrysalis, and skin of the caterpillar.—*J. Fullagar, Canterbury.*

Praying Mantis (*Mantis religiosa*).—Information derived from the "Naturalists' Library," subject, Entomology, vol. i. pp. 227—234.—The characteristic features of the family Mantidæ are as follows:—"The head is long, triangular, and vertical, furnished with large eyes (sometimes having a triangular prolongation in front), and three distinct stemmata; antennæ long, filiform, and slender, composed of numerous joints, sometimes pectinated in the males; terminal joint of the palpi ending in a point; ligula quadrufid; tegmina thin and reticulated, usually covering the wings, legs unequal, the anterior pair elongated, thickened, and armed with teeth; tarsi five-jointed." In this tribe is included a variety of very singular forms, familiarly known as *walking leaves,* from the colour, shape, and general appearance of the insects, which have been made familiar to all by the pen of the author and the pencil of the artist. The Mantidæ are carnivorous, and prey upon weaker individuals of their own class, being enabled to seize their prey by the great length of their fore legs, which being situated near the head, and the thorax being very long, admits of their extension forwards for a considerable distance, and the thigh being thick, grooved on its inner edge, and armed with a double row of strong spines, upon which the tibia, which is likewise spinous on its interior edge, closes like the blade of a pocket-knife upon its handle, and so secures the smallest object that may be within, whilst in the combats which take place between those creatures, it is a formidable weapon, one blow from which will effectually decapitate an adversary. These raptorial legs, of which the tarsus is short and weak, often equal, and in some instances surpass, the entire length of the body, and being usually borne extended before the insect, and frequently raised, and as it were clasped together, have invested those insects with an ideal power of divining the course of future events, and consequently in many places they are regarded with a kind of religious veneration. In the south of France *M. religiosa* has the character of pointing out the way to lost children and travellers. The Hottentots venerate another species, and any person upon whom it alights is supposed to be a special favourite of Heaven, and the recipient of a peculiar degree of sanctity; and these fancies have suggested to systematic authors such names as, "oratoria," "religiosa," "precaria," "pater-noster," &c., titles not very appropriate when we consider the fierce and gluttonous character of these creatures, which are continually capturing and devouring all the suitable insects which come in their way, closing one armed joint upon another, so as to transfix and secure the victim; whilst their pugnacious disposition leads them to indulge in frequent contests with each other, their manœuvres during which are described as resembling those of hussars fighting with sabres, and when the battle is decided, the victor devours his late antagonist. This love of war, which surely must command our sympathy, causes them to be kept by the Chinese, who delight in the exhibition of their warlike proclivities. Europe contains only a few of the smaller species of the Mantidæ, one of which is found as far north as Frankfort-on-the-Maine, the tropical and temperate regions of the globe being their habitat. The eggs of these insects are very numerous, are of an elongated form and yellow colour, and are disposed in two rows, being inclosed in a soft substance which hardens by exposure to the air. The egg-case is attached to the stalk of a plant. "As a generic designation, the term Mantis is now limited to such members of the family as have the antennæ simple, head without an angular projection in front, eyes hemispherical, anterior legs long and falciform, the others slender and without spines. Many of them are of considerable size, and with a very few exceptions, extra-European. *Mantis religiosa* is about two inches in length, of a light green colour, inclining to brown in some places, and occasionally almost entirely of the latter hue; thorax elongate, particularly in the female, and smooth on the surface; tegmina as long as the abdomen, green and unspotted, each of them with a strong longitudinal nervure, at some distance from the anterior border; under-wings of an elongate triangular shape, green anteriorly, and of a firmer texture than behind, where the colour is pale white; the abdomen and legs are also green; the anal spines, as well on those on the anterior legs, deep chestnut. On the inner side of the coxæ of the fore-legs there is a yellow spot bordered with black,—a peculiarity which, according to Latreille, serves to distinguish this species from one nearly allied, which is a native of the Cape of Good Hope. This species appears to be general throughout the Mediterranean region, and in many places it occurs in great profusion. It is the *M. prie-dieu* of the southern provinces of France and Italy."

Dogs and Portraits.—"J. R. D.'s" Pomeranian dog is not singular in his dislike of a portrait. Some years ago we had a Pomeranian who took a particular dislike to a portrait of my grandfather, which hangs in the dining-room; sometimes she would jump up and bark at it without any apparent reason, but if the wind made a noise in the chimney she would often jump on to the sideboard (over which the portrait hangs), to get at it. Any noise whatever that she didn't understand she used to refer to this picture and bark accordingly—flattering for the artist. I may mention that the eyes in the portrait are very well done, and seem to look at you wherever you stand; this may have had something to do with it.—*Edward Thornton Evans.*

Double Anemones.—There is at the present moment living in my marine tank a specimen of the "Plumose" anemone from Tenby, which has been gradually developing for some time past; another about half way up the stem, and now presents all the appearance of a double anemone. Is not this very unusual?—*W. H.*

Breaking of Fern-cases.—Looking over the back Nos. of Science-Gossip, I find on page 119, No. 5, an inquiry in regard to the breaking of the shade of a fern-case, the owner suggesting that it might be due to the expansion of heated air. This is very unlikely. If the shade fitted tightly in a groove, this might occasion it, but the most probable cause is that in wiping the interior shade at some time the surface was slightly scratched, and this scratch suddenly extended into a crack. This is no uncommon circumstance. Barometer tubes are frequently cracked by wiping them with gritty cloth pushed through with a wire; and on one occasion I lost several glass jars from having been careless in freeing them from sand and grit before wiping them out. They stood quietly on the shelves for some time and then fell to pieces apparently without any cause.—*J. P.*

Enormous Puff-ball.—I have in my possession a specimen of the common Puff-ball, *Lycoperdon gemmatum*, of what I imagine to be a very unusual size, which was found near this town on September 22nd. The dimensions are as follows:—Height from the ground, 5¼ in.; greatest diameter, 6¾ in.; diameter at right angles to same, 4½ in.; circumference, 18 in. It is of a very light and spongy consistency, but nevertheless weighs 13¼ oz. I am not aware that it is a different species from the common one; as, size excepted, it has precisely the same appearance, smell, &c., both externally and internally, as the latter.—*Frank J. Allen, Shepton Mallet, Somerset.*

Goldfish Breeding.—Will A. J. R. Sclater, in explanation of his article in September number, kindly say if the fish given away from the ponds of his friend lived and grew, and also can he explain how it was that the fish would breed in the ponds of his friend and not in his own tank, although he tried for twelve years? Will he also explain how the tanks or ponds were supplied with water, and what would be about the temperature of the water during the breeding-time?—*J. B. Ky.*

Dianthus cæsius. — Your correspondent "H. A. M." has given an interesting account of Cheddar, but I think he is mistaken in saying that the Cheddar Pink (*Dianthus cæsius*) is nearly extinct. I have occasionally visited Cheddar for a good many years, and have found the pink any time I have looked for it, but never more abundantly than in June of this year. Perhaps "H. A. M." has been too "prudent" to go where the "women" go to obtain them.

EXCHANGES (*continued*).

Eggs of Curlew, Common Sandpiper, Kingfisher, Dipper, Red Grouse, Crow, Ray's Wagtail, Kestrel, Sparrow-hawk, and others, for other good Eggs.—R. Standen, Goosnargh, near Preston, Lancashire.

Lepidoptera, British Land and Freshwater Shells, for others, or for works on Natural History.—W. K. Mann, Granby House, Granby-hill, Clifton, Bristol.

Well-mounted Slides or good Material for mounting; for unmounted Animal Parasites, in spirits.—John Boyd, Sunnyside, Victoria-park, Manchester.

Rare Species of British Land and Freshwater Shells offered for specimens of *Unio tumidus*, var. *ovalis*, from the Exeter canal, or specimens of the white transparent *Bulimus acutus*, from Cornwall.—Address, Miss Fanny N. Hele, Fairlight, Elmgrove-road, Coltram, Bristol.

Other Rare Plants wanted, for *Astrantia major*, *Lychnis viscaria*, *Carum verticillatum*, *Rumex maritimus*, *Senebiera didyma*, *Calamagrostis lanceolata*, &c. &c.—H. L. J., 33, Bridge-street, Cambridge.

Well-blown specimens of Puffin, Razorbill, Shag, Herring Gull, Lesser B. B. Gull, Oyster-catcher, &c., for other good Eggs.—Alfred Bindon, 22, Argyll-street, W.

For the beautiful little Millipede, *Polyxenes lagurus* (alive or dead), or its hairs mounted, send two good mounted Slides. The Millipede is illustrated in Science-Gossip for 1872, page 31. No lists accepted.—C. Eaton, 48, Curriers-lane, Ipswich.

Eggs of Great Crested Grebe, Ring-Ousel, Red-breasted Merganser, Quail, Lesser Tern, Black Tern, Arctic Tern, Creeper, Kestrel, Mealy Redpole, Woodchat, Shrike, and others (with one side hole), for other good Eggs.—T. W. Dealy, 142, Clarence-street, Sheffield.

Hookeria læte-virens (not in fruit), *Trichostomum flexicaule*, *Mycerella julacea*, offered for *Bartramidula Wilsoni*, *Œdipodium Griffitheanum*, *Bryum demissum*, *Buxbaumia uphylla*, or other rare Mosses.—Miss Fisher, 6, Wallerton-road, St. Peter's-park, Paddington, W.

Wanted, 39, 135, 194, 220, 260, 345, 360, 535, 637, 701, 746, 772, 1029, 1103, 1135, 1208, 1225, 1229, 1233, 1263, 1282, 1293, 1321, 1341, 1342, 1352, 1363, 1411, 1474, 1618, Lon. Cat., 7th edition. Send lists of Desiderata.—J. Harbord Lewis, 180, Mill-street, Liverpool, S.

BOOKS, &c. RECEIVED.

"The Octopus." By Henry Lee, F.L.S., &c. London: Chapman & Hall.

"Optics and Light." By Dr. Lommel. London: H. S. King & Co.

"Monthly Microscopical Journal." November.

"Land and Water." November.

"Boston Journal of Chemistry." October.

"American Naturalist." October.

"The Western." October.

"Ben Brierley's Journal."

"Transactions of Watford Natural History Society."

"Transactions of Eastbourne Natural History Society."

"Journal of Applied Science."

Communications received up to 8th ult. from:—F. K.—G. H. K.—J. R. S. C.—C. H. G.—J. P. B.—J. E. S.—W. W. W.—J. F. R.—F. R. M.—C. M. C.—S. A. B.—G. B.—W. E.—R. B.—E. M. F.—R. S.—W. W. R.—T. P.—H. B. T.—J. L. H.—C. P.—T. W. W.—J. P. G.—E. C. O.—W. K. M.—Dr. L. L.—H. J. T.—M. M.—G. S.—J. P.—A. J. R. S.—W. S. jun.—J. W.—J. B.—W. H. P.—W. G.—J. H. F.—W. P.—A. E.—W. F.—F. W. R.—A. M. C.—J. P.—C. M. C.—H. E. W.—T. W. D.—H. B.—A. B.—W. W. W.—C. D.—C. B.—Dr. C. C. B.—W. H. G.—C. E.—E. N. B.—J. C.—J. C. T.—F. H. W.—W. G. C.—E. D. M.—E. E.—C. P. O.—H. J. M.—F. E. F.—H. L. J.—G. H. K.—F. M. H.—J. H.—W. E.—B. B.—G. O. H.—E. M.—J. P. B.—J. G.—L. R. G.—C. L.—J. H. U.—E. L.—T. B. W.—W. H. G.—F. C.—T. B.—T. B. L.—T. J.—F. H. F.—J. H.—H. T. R.—J. S. M.—W. W.—C. M. C.—R. H. F.—T. H. B.—C. H. M.—J. H. J.—H. P. M.—W. G. C.—F. H. A.—J. H. M.—J. B.—F.—W. G. C.—W. P.—J. R. T.—H. C. C. M.—W. G. D.—M.—W. W. W.—J. S. A.—J. H.—A. J. R. S.—O.—J. H. G.—E. H. W.—&c. &c.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of each month.

M. A. Jones.—Your specimen of fungus on willow-leaves is *Lecythea saliceti*, Lev.

E. T. Scott.—Your rust is *Lecythea populina*, Lev.

James Thomson.—The fungus on specimen of grass sent is the common Red Rust (*Trichobasis rubigo*).

D. J. (Manchester).—You are quite correct in those numbered 1, 2, and 3; they are all variations of the Brittle Bladder-fern (*Cystopteris fragilis*). No. 2 is the variety recognized by some pteridologists as *Cystopteris dentata*; the other two are the usual form. No. 4, *Lastrea dilatata*, and No. 5, also a slender frond of *L. dilatata*.

W. J. H. (Old Broad-street).—Your fern is a seedling of the common Brake (*Pteris aquilina*, L.). In its present state, it is difficult to determine the species, but one very similar was found many years since by Mr. Kirk, growing in a newly excavated well at Coventry. At the time it was thought to be a variety or a new species; in process of time, however, when the rhizome is older, it assumes its old familiar face.

J. H. M.—The specimen inclosed, found on walls in London, is the *Arenaria serpyllifolia*, Linn.; it is not uncommon on old walls, sandy pasture fields, &c. You should look about in similar situations for the *Arenaria leptoclados*, Guss.; it is a pretty species, but much more slender in its habit than the above: it has been confounded with *A. serpyllifolia* until recently.

T. Buck.—You will find ample information as to where "paste eels" are produced, by turning to the vol. of Science-Gossip for 1873.

J. S. M.—Crickets may be easily caught in houses where they abound by exposing shallow plates or saucers of table beer or stout. In fact, they get drunk!

E. H. Wells.—Please say whether by "Pond Mussel" you mean *Unio* or *Anodon*.

J. Hopkinson.—Parts to hand. Notice next month.

To Querist.—A good many queries necessarily stand over. Several packets we have sent off to be named, have not yet been returned to us. Some may have miscarried; several are unidentifiable.

C. Bradley.—We believe the new edition of Pritchard's "Infusoria" will be republished by Messrs. Van Voorst, London.

C. M. C.—The name of the "Portuguese Man of War" is *Physalia utriculus*, which belongs to the oceanic *Hydrozoa*. The Nautilus is a cephalopodous mollusk, and few animals are more widely separated than these two.

Gram.—An error appeared in both replies, published at pp. 259 and 260 of Science-Gossip, regarding the botanical name of "Gram." The mistake is only an error in printing, but it might be confusing to Mr. John E. Daniel. Instead of *Acer arietinum* it should be *Cicer arietinum*, "Chick Pea" is one of its common names.—J. R. J.

Captain W. Provis.—Newman's "Butterflies and Moths," published in one vol. at 25s., by Hardwicke, 192, Piccadilly, is the best work on British Lepidoptera.

S. A. B.—The drawing is too obscure for any geologist to determine the species of fossil, but there is no doubt it is an *Encrinite*, not a Coral.

E. Compton.—"Geological Stories" is now in a second edition, and may be had at 192, Piccadilly.

W. P. and others will, we hope, pardon us for not inserting further lists or seeds as microscopic objects. We have received a very large number, and are extremely obliged to all our correspondents for their kindly courtesy.

H. J. M.—You had best get "Davies on Mounting," new edition, published by Hardwicke, 192, Piccadilly, at half a crown.

M. Morton.—Your specimen is the sea-side Spurrey (*Spergularia maritima*).

J. C.—Dew is simply the condensation of the moisture contained in the atmosphere upon any cold surface, such as that of a leaf. Leaves cool rapidly in the evening, and their surfaces are thus brought into contact with the warm atmosphere resting over them.

Mary Morton has sent us a packet of seventeen mosses, &c., to be named. We cannot but think this a stretch of kindness on her part. Could she not send us a few more? Some of them are among the very commonest of objects.

E. J. Lever.—You had best obtain the cheap elementary work on Mineralogy published by Collins & Co., Glasgow. Dana's Manual is the best work on the subject, but very advanced. You can get Hardwicke's Catalogue of Scientific Books by applying to 192, Piccadilly. The work on Crystallography, published in Orr's "Circle of the Sciences," ranks highly.

Ignoramus.—The Earwigs (*Forficulæ*) are arranged in an order called *Dermaptera* or *Euplexoptera*. They are considered to have a greater affinity with the *Orthoptera* than with the *Coleoptera*, and have an incomplete metamorphosis.

C. Donagan.—Mr. W. W. Wilson, F.L.S., writes to us to say that the Birmingham Natural History and Microscopical Society very properly admits lady members, and adds, what we believe to be the natural consequence, that they are most assiduous in their attendance! Of course they are!

EXCHANGES.

Wanted, a few specimens of Fossil Fruit from the Sheppey section of the London clay; also Shells from the Barton series.—E. Lovett, Holly Mount, Croydon.

I have about 300 species of British Lepidoptera, and I am desirous of exchanging them for other specimens of Natural History, either alive or preserved.—W. Watkins, 21, Caves'-terrace, Shepherd's-bush, W.

Diatoms, and Cuticle of Petal of *Pelargonium*, well mounted, for good Slides of *Polycistina*, Spicules, Spines, &c. —T. H. Buffham, Clarence Villa, Clarendon-road, Walthamstow.

Two or three Heads of *Equisetum* (Horsetail) containing spores, wanted; well-mounted Bee's-tongue or other Slide offered.—J. H., Jun., 45, Kensington High-street.

Orthotrichum phyllanthum, *O. Bruchii*, *O. leiocarpum*, offered for *O. cupulatum*, *O. anomalum*, *O. pumilum*, *O. Sprucei*, *O. rivulare*.—Miss Warren, 39, Thurloe-square, S.W.

Transverse, vertical, or oblique sections of Human Tooth-fang, mounted; for Anatomical, Physiological, or other Micro. Slides.—W. G. Daish, Melville-street, Ryde, I.W.

North American Lepidoptera and Coleoptera for British Lepidoptera.—Captain Wm. Provis, Detroit, Michigan, United States.

For Egg-shell of Japanese Silkworm Moth, for Polariscope, send a stamped directed envelope to W. H. Gomm, Somerton, Somerset.

For Seeds of Portulaca, send a stamped directed envelope to Wm. Goodacre Cokayne, Forest-road East, Nottingham.

Cystals for Polariscope and other Slides, for Mounted Objects. Will send a quantity to select from.—Thomas Buck, 111, Corporation-road, Middlesbro.

Wanted, to exchange for Physiological and Anatomical Slides, Lieberkuhn's, or as part of the price of a high-power objective, the whole of Science-Gossip from the commencement to the end of last year, 7 vols. in publisher's covers, the rest unbound; in excellent condition.—O., 3, Woodville, Gravesend.

Several species of Graptolites from co. Down, for species from other localities.—Wm. Gray, Mount Charles, Belfast.

Wanted, Marine Algæ, Polyzoa, Marine Mollusca, Starfish, &c. Good exchange.—F. R. Martin, Shaldon, South Devon.

Wanted, *Draba incana* and *rupestris*, for other Rare Plants.—Send lists to W. H. P., 2, Belgrave-street, Derby.

Sphinx convolvuli (captured this season).—Wanted, *A. cratægi*, *L. sinapis*, *E. blandina*, *E. Cassiope*, *L. Sibylla*, *A. Iris*, *G. C. album*, *A. Lathonia*, *T. pruni*, *P. Arion*, *P. Acis*, *H. paniscus*, or offers.—W. Low Sarjeant, 6, Dagnall-park-terrace, Selhurst, S.E.

A one-eighth Object-glass (Gundlach's), offered for a Copy of Smith's work on Diatoms.—Address, R. Battersby, M.D., Glindalough, Caragh Lake, P.O., Killarney.

Wanted, good Diatomaceous Material, for *A. Ehrenbergii*, mounted.—Address, M. Fowler, 20, Burn-row, Slamannan, N.B.

Wanted, *Acme lineata*, *Limnæa involuta*, and *Limax gagates*, for *Helix pomatia*, *Helix carthusiana*, *Planorbis lacustris*, and other British Shells.—Address, M. M., Post Office, Faversham, Kent.

Shells offered, specimens of *Zonites excavatus* and var. *vitrina*, *Zonites glabra*, *Helix rotundata*, var. *alba*, *Cochlicopa tridens*, var. *crystallina*, and *Helix fusca*, &c.; for *Limnæa involuta*, *Acme lineata*, *Vertigo alpestris*, *V. substriata*, *V. pusilla*, *V. angustior*, or other rare Shells.—Joseph Whitherham, Cross-lane, Marsh, near Huddersfield.

Thirty selected, named Micro Fungi, mounted in book form, for other objects.—T. Brittain, 52, Park-street, Green Heys, Manchester.

For *Puccinia Epilobii* (brand), address T. Brittain, 52, Park-street, Green Heys, Manchester. No exchange required.

For *Peronospora infestans*, Potato Blight, send stamped envelope and object of interest to T. Brittain, 52, Park-street, Green Heys, Manchester.

Arabis stricta, *Scirpus triqueter*, or others, offered for *Hippophae rhamnoides*.—Address, G. B., 143, New Bond-street, W.

For Forbes' Coloured Index of British Shells, will be given Fossils, Minerals, Shells, or Polish Slabs of Madrepores, or Malachite Ornaments.—A. J. R. Sclater, Bank-street, Teignmouth.

Wanted, some well-prepared and well-mounted Chemical Crystals: the commonest kinds not wanted.—Send lists, &c., to H. B. Thomas, St. Peter's Coll., Cambridge.

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WYMAN AND SONS, PRINTERS, GREAT QUEEN STREET, LONDON, W.C.