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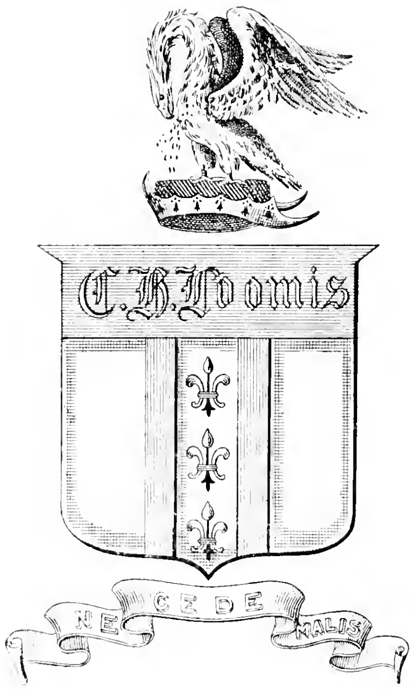
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SCIENCE-GOSSIP:

1882.

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Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

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PREFACE.

THE necessity to write a few lines by way of Preface to the present volume reminds us that SCIENCE-GOSSIP has been in existence for eighteen years. That period includes, perhaps, the most important epoch in the history of Natural Science. The doctrines of Evolution and Natural Selection have practically arisen, so as to influence scientific research in every direction, within the space of time our journal has been in existence. Zoology, Botany, Geology, and Microscopy especially have assumed new aspects, or started on fresh lines of inquiry. And, notwithstanding the immense number of new subjects which have sprung up, it cannot be denied that all tend to unify our knowledge of Nature, rather than to perplex us.

We flatter ourselves that the volumes of SCIENCE-GOSSIP which have appeared during this historical period will be found well to the front in recording new discoveries, in popularising them, as well as partaking in the active scientific work of the time.

The contents of the present volume will be found of equal value to any of its predecessors. If challenged, we should point to the series of articles on "Fossil Botany," "The Schizomycetes" (or Bacteria, &c.), the "Freshwater Mites," "Microscopical Drawing," the "Natural History of Jersey," and many others too numerous to mention, as illustrations of original research, as well as of popular expositions of important scientific matters.

New *confrères* are springing up around us, all animated by an excellent spirit, and their call into existence is an indication of the active spirit of inquiry abroad, as well as of its extension.

It is with much gratification, however, we state that we were never before supported by so many able and zealous contributors. Our outlook for the next year is singularly promising, and we are already provided with much new and interesting material, insomuch that we anticipate the nineteenth volume will even transcend in interest the eighteenth. We take advantage of this announcement to enlist the sympathies of our friends in extending the circulation of SCIENCE-GOSSIP.

LIST OF ILLUSTRATIONS.

DRAWINGS AND PAINTINGS FROM THE MICROSCOPE.

DRAWINGS of microscopic preparations under the highest powers, illustrative of minute points of structure, are necessarily of great scientific value, and are the result of a high intelligence brought to bear upon the revelations of the instrument. But there is open to the microscopist of artistic taste and ability, a most engaging pursuit in making drawings under moderately low powers, where all the varieties of well-managed illumination can be brought to bear. Opaque objects in such circumstances may be worked up with a binocular microscope into pictures of great artistic excellence, showing extraordinary points of colour, contrasts of light, and solidity of form. Not only prepared objects, but fresh and ever-living specimens may be so disposed and displayed by combination of illumination, as to be inconceivably beautiful, and worthy the efforts of the most accomplished artist; the marine, and especially the fresh-water polyzoa would be objects of this class. A water-colour painting of a group of peaches or grapes, although of no scientific value, has, like any similar work, the peculiar charm of a gratification felt in contemplating the quality of the art exercised in producing it. Under the microscope there are objects of surpassing beauty, elegance of form, effulgence of colour, and with definite arrangements, revealing charms of light and shade, that words, even from the pen of a Ruskin, would fail in describing—paintings of such things without reaching a scientific status are certainly as acceptable as any studies of still life, and are far more interesting, as exhibiting a curious beauty and structure, unrevealed except by the instrument. It is proposed to offer a few hints from practical experience of the best methods of procedure. It is presumed that the student has a fair knowledge of ordinary drawing, understands something of colour, and can handle a microscope and its various accessories as a tool with ease and certainty, the most successful at this work would be a dexterous microscopist with a great love for and appreciation of art, and a capability of rendering it; but practice in this direction does wonders.

The effect of a microscopical painting is greatly enhanced by its being drawn within a circle, surrounded by a black margin, forming a square. The size of this circle is of some importance, it may be too large or too small. After experiments it was ascertained that a circle three inches and three-quarters in diameter gave the best effect, and approached nearest the impression made on the mind of a field of view as seen with a B eye-piece; to have such a circle always handy, a brass gauge should be made four inches and three-quarters square, with a circular opening of the dimensions above given. This gauge is of more importance than may at first appear: placed on a drawing block, a pencil run round the interior circle, and outside the square edge, gives the interior space for the drawing, and the lines to guide the backing up of the margin with Indian ink. The advantage of a block thus prepared is manifest. When proceeding to arrange an object for drawing, the camera lucida, for fixing positions, tracing general contours and outlines, is an important instrument. Removing the cap of the eye-piece (the A should always be used in drawing) the camera is slipped on and adjusted. After clamping the object to the stage, the body of the instrument is carefully depressed into a horizontal position, as the light is arranged just sufficiently to plainly see the object through the camera and the margin of the field of view well defined with a Ross No. 1 stand. The distance from the front of the objective to the edge of the camera prism is about twelve inches, and from the camera to the table surface (at right angles) eleven inches; the view projected on the circle of paper placed on the table would consequently overlap: block should therefore be raised in any convenient way, until the field of the microscope and the white circular space exactly coincide, the subject will then be in fair proportion. Another advantage of the black margin is, that if, when using the camera, the drawing should slip, as it is very apt to do, the dark circle will assist in replacing it.

The light on the paper should be in excess of the light from the object. In the employment of the camera lucida, speed and precision are essential. Quickly make easily recognised points and lines; do not linger over small matters; nothing fatigues the eye sooner than the use of this instrument. Indeed, to manipulate it with advantage requires considerable practice. No drawing can be greatly advanced by it. Contours, salient points, and especially measurements may be quickly and accurately fixed and drawn, but any attempt at elaborate detail will end in confusion. Useful as the camera is in the earliest stages, it should be discarded as soon as possible. The microscope is then placed in position, the lights adjusted, and the drawing continued by actual observation through the instrument. The blocks should be made of carefully selected paper, thin, hard, smooth. The drawing in its general details should be made with a pencil of the best quality, extremely hard and capable of taking a fine point, and yet not tearing the surface of the paper. The work may then be corrected and improved with a fine pen charged with Indian ink or Payne's grey, somewhat diluted. If intended for painting, the drawing should never be touched with rubber of any description, and no attempt at shading should be made either by pencil or pen. At this point the ability of the artist begins to tell, and no written guidance can be offered beyond some general hints, derived by experience, of the character of objects best adapted for copying and the method of exhibiting and illuminating them. The light is of paramount importance: it should be a movable argand gas burner, fed through a flexible tube, capable of being raised or depressed, with a green cardboard shade. The edge just below the level of the flame in the shade; circular holes and slits may be cut for special purposes. Of illuminating transparent objects little need be said. Transmitted light from the simple mirror means a good effect: it is obtained by allowing the rays of light to pass through a piece of thin tissue paper placed over the opening of the substage. Such objects as the proboscis of blow-fly, tongue of cricket, spiracles and other parts of insects cannot be displayed to greater advantage. It may be mentioned here that to have an effective drawing, the object or the part selected should be magnified to nearly occupy the field of view. With sections of injections (opaque) such as tubercular lung, the whole field would necessarily be filled. As high a power as is consistent with the preservation of a fairly plane surface should be employed. The instruments for light are the parabolic illuminator (see Carpenter, 5th ed. p. 141), a small plane convex condenser, on separate stand, and, the most important of all, the side reflector or silvered speculum (see Carpenter, 5th ed. p. 150): the most useful form of speculum, for drawing purposes, is that which has a separate fitting to the *stand* of the microscope. That which is attached by a spring clip to the objective is not so efficacious in producing oblique rays, nor so completely under control in producing artistic contrasts of light and shade by the primary object to be attained. The Lieberkühn has a positive defect in artistic illumination, it sends the light perpendicularly all round the object, giving little or no diversity of shadow, and cannot be used with effect.

In painting objects under the parabolic illumination, or with the side speculum, the painting of the background should be treated with especial care, and stippled up to the tone. Actually seen under the instrument, the iridescent eggs of insects are generally attached to fragments of wood or leaves, parasitic eggs to feathers. These should be carefully painted, and the background beyond stippled up to the edge of the circle. Such objects make lovely drawings. It would be difficult to particularise subjects, suitable for drawings—so immense are the resources. Many are so exquisitely beautiful, that even with good management, cultivated taste, and fair skill, the best representations fall far short of the actual object; but let not the student be disheartened, for to render these things on paper in their perfect integrity, it would be necessary, if such a process could be conceived, to dip your brush in light. All that can be hoped for, is a semblance. The young artist may here be reminded that in his painting the most exalted light at his command is the pure white of his paper, which should be always jealously preserved. A prepared specimen, or slide, should be perfect, but many most common objects of easy access hastily arranged, form admirable subjects for the purposes of drawings.

Some years ago a work on the microscope was published by the late Richard Beck. It contained a plate representing a mere splinter of lucifer match under reflected light. Nothing is more suggestive than such a drawing as showing the accessibility of subjects. Of preparations there is a wide field. A few may be mentioned. Sections of shell with a dark ground or parabolic illuminations. A portion of the field should be disclosed to be carefully stippled up to an even tone, some degrees lower than the black margin; polycistina and foraminifera, under parabolic illumination. Power to be used two-thirds. The shells should not be selected or arranged (all arrangements are atrocious), but a fair group drawn in position as they happen to be found. Polycistina, as an opaque object, with side speculum, under two-thirds is a most beautiful subject. In using the speculum, the gas flame should be as close as possible to the stage, and on the same level; a small plane convex condenser, on a separate stand intervening, throws the light on the speculum, which can then be manipulated, until the best effect is obtained. Eggs of insects, by side lights, are most beautiful. The power should exhibit them as nearly filling the field background, and accessories should be painted to throw them forward. Sections of spines of echinida are seen to advantage with parabolic illumination. Too much care cannot be bestowed on the drawing, before it is touched with colour. Other beautiful subjects are the marine algæ, with their pyriform spores. The sori and indusia of ferns—Marattia in particular, showing a series of pods, on a delicate green frond, with inch objective and side-light, is magnificent in colour and solidity. The same may be said of the polypidoms of zoophytes, peristomes of mosses, anthers and pollen of flowers. Rotifera and polyzoa may be rapidly and effectively drawn on dull black paper with opaque colours. Many injected preparations can only be copied in the same way. The pigments should be mixed with flake white and gum, which forms an admirable medium for drawings of this description. Heads of spiders, as a specimen, *Epeira cornea*, showing the eyes, and many parts of insects, as opaque objects under an inch objective and side light, are worthy the highest artistic efforts. A combination of illumination may be employed with much success. That most common insect, Tingis, with its perforated elytra and lace-like appendages, can only be displayed, if mounted as a transparent object, by light from below, with the dark ground illuminated; and from above, with the side speculum, tongues of mollusca, and many semi-transparent preparations, should have simultaneous lighting in the same way.

The colours should be dry cakes rubbed down as required. Moist colours in tins soon become contaminated. The first importance in this work is to keep the palette pure; everything should be of the first quality. Pale cadmium, cobalt, Payne's grey, and Hooker's green No. 1 and 2 are indispensable. The Indian ink should be of superlative excellence; its quality varies, from six to eight shillings for a very small stick, to a shilling for one ten times the size. In pursuing microscopic painting it is essential to be as careful and tender of your materials as old Hunt must have been in his wonderful transcripts of flowers and birds'-nests. All your colours should be prepared, and your tints mixed (to use the words of Opie) with brains.

E. T. D.

Crouch End.

THE KANGAROO.

By W. T. Greene, M.A., M.D., &c.

In a country that still continues to be the home of a peculiar type of animal and vegetable life, which, during that period of the world's history known to geologists as the Oolitic age, was common to the entire globe, but has long since been elsewhere superseded by new forms, we may naturally expect to find much that will attract and interest a thoughtful mind; and among the wonders of Australia—for it is to that paradoxical country I allude—there is scarcely to be found a more fascinating subject of study for a lover of nature and natural history, than the curious group of animals known by their English, or rather Australian name of kangaroo.

The family of the Macropidæ, or, more correctly speaking, Macropinæ, as several species included under the former designation are not properly kangaroos, consists of several genera, subdivided into numerous species (between thirty and forty in all), at present exclusively confined to the continent of Australia and a few of the islands, including Tasmania, immediately adjoining; although, as the fossils discovered in various parts of the world abundantly testify, they formerly enjoyed a much more extensive range.

Captain Cook and Dr., afterwards Sir Joseph, Banks, were the first who brought to Europe anything like a correct account of "the wonderful nondescript animal of New Holland," as they termed the Tasmanian kangaroo.

It is no wonder that the king of the Marsupials should have surprised Cook and his companions, for he is really a most extraordinary creature, and requires to be seen (seen that is, in his native woods) in order to be appreciated; for the crawling, slouching gait of the poor captives in Europe conveys but a slight idea, indeed, of the free and bird-like movements of the kangaroo at home; whether flying before his enemies down the sideling of a hill, and clearing, in his course, logs and bushes many feet in height, or proceeding, more leisurely, across some grassy plain to his favourite watering-place or camping-ground.

Cook's description is as follows:—

"In form it is most like a jerboa, which it also resembles in its motions, but it greatly differs in size, the jerboa not being larger than a common rat, and this animal, when full grown, being as big as a sheep; this individual (the one shot by Mr. Gore) was a young one, much under its full growth, weighing only 38 lbs. The head, neck and shoulders, are very small in proportion to the other parts of the body, which is thick near the posterior parts, and tapering towards the head; the forelegs of this individual were only four inches long, and the hind legs two-and-twenty; its progress is by progressive leaps or hops, of a great length, in an erect posture: the forelegs are kept close to the breast, and seemed to be of use only for digging: the skin is covered with a short fur, of a dark mouse or grey colour, excepting the head and ears, which bear a slight resemblance to those of a hare. This animal is called by the natives a 'kangaroo,' and is excellent eating."

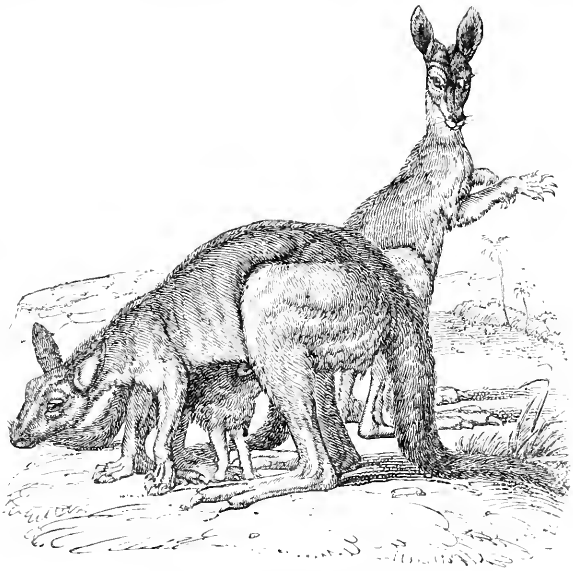

Fig. 1.—Group of Great Kangaroos.

A statement which the worthy commander found it necessary to qualify further on, but which can nevertheless be recommended to the notice of intending emigrants, and also to the Acclimatisation Society; but the latter, I believe, are already aware of the fact that there is no soup, not even excepting turtle, superior to that which is made from an old man's tail. "Old man" being the popular name applied in Australia to the adult male kangaroo, renders further explanation of the above, at first sight, rather startling statement, unnecessary.

Kangaroo steaks have been praised; but although a combination of circumstances might have rendered them occasionally desirable, they are certainly insipid, and decidedly tough. Captain Cook early discovered this; for we find him recording in his log that an adult specimen, shot by Dr. Banks, was so unmanageable, that he was reluctantly compelled to make it over to his men, who were less fastidious, or possibly had stronger jaws; at all events, they, as he tells us, "speedily devoured it." However, there is no mistake about the tail, that makes delicious soup.

There is no anatomical distinction of any importance existing between the different species of kangaroos, which are distinguished from each other by habits, size, and colour only. All are provided with a pouch, or supplementary uterus; all have peculiar bones attached to the front of the pelvis for the support of that curious appendage; all have the bones of the fore-paw, or arm, free and so articulated as to admit of rotatory movements; all have the same dental system, and the hind legs three-jointed.

Fig. 2.—Great Kangaroo (*Macropus major*).

The thigh bone much resembles the shoulder-blade of other animals, and is broad and deeply grooved for the attachment of the powerful muscles that enable these animals to perform the marvellous feats of agility for which they have become renowned. The second joint is long, but the muscles are here reduced to tendons of immense strength and power, so much so that the older kangaroos have occasionally been known to snap the bone asunder, when startled into taking a sudden spring, so powerful is their contractile force. The foot, which in the adult animals of the larger kinds is from twelve to eighteen inches in length, is tipped with a formidable claw three or four inches long; the other toes are rudimentary—one small nail on the outside of the foot, and two, still less, and joined together, opposite to it on the inner side, alone representing them. The forelegs, or arms as they are sometimes called, are short; and the paws, which are comparatively large and broad, are armed with five strong claws. The head is not unlike that of the fallow-deer, and the countenance is usually mild and placid, but seldom exactly alike, in point of expression, in any two individuals; some of the old males have prominent Roman noses, like a Merino ram.

The carcass of the kangaroo, like that of the European hare, rarely, if ever, contains any fat; and much diversity of opinion prevails as to the nutritive quality of the flesh, of which dogs are never very fond, although they feed greedily on opossum, which looks drier, but is certainly not quite so tough.

The aborigines, however, used formerly to prize kangaroo flesh as the richest dainty their country afforded, and celebrated the slaughter of an "old man" by a grand "corroboree," or war-dance, much in the same way that the Hottentots do the slaying of a lion, or the negroes of Central Africa the destruction of an elephant or gorilla—for, harmless though it be when uninterfered with, the kangaroo is the largest animal at present inhabiting Australia, and will sometimes fight fiercely enough when brought to bay, standing with its back against a tree, and tearing the incautious aggressor with the powerful claws of its hind feet, or hugging him to death, bear-fashion, with its small, but muscular fore-paws; occasionally, too, when hard-pressed, the kangaroo makes for a water-hole, and standing in it up to its neck, often succeeds in drowning its adversary—so that "blackie," not without some reason, looked upon its capture as a feat of importance, and worthy of commemoration by dance and song.

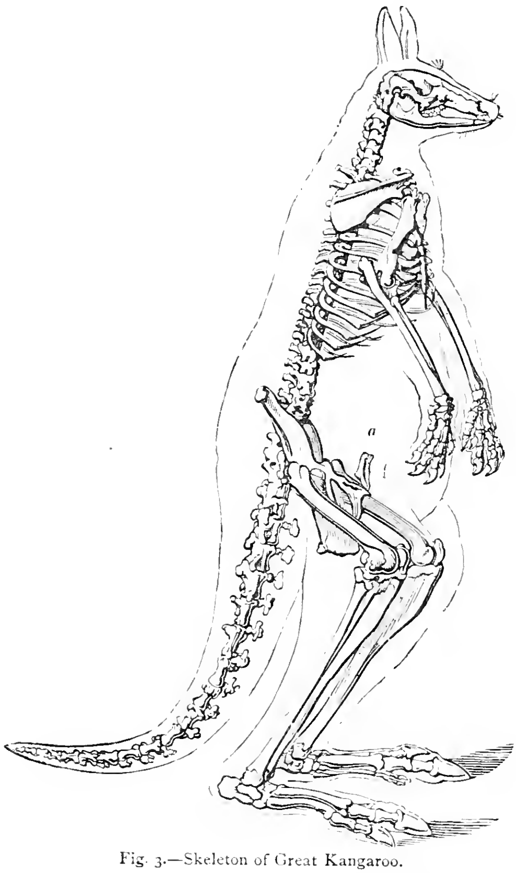

Fig. 3.—Skeleton of Great Kangaroo.

For a long time considerable uncertainty existed as as to the mode of reproduction peculiar to these animals, and even now the doubts upon this point are far from being cleared up; although the numerous experiments made at the Zoological Gardens, both in London and Sydney, ought to have settled the question long ago. The young kangaroos are not born at any particular season of the year, so that one dam may be seen with the bare rudiments of a young one in her pouch; whilst another, in the same "mob" or herd, has a full-grown "joey" hopping by her side.

The old doe-kangaroos have a habit, when closely pressed by their enemies, of pulling their young ones from their hiding-place in the maternal pouch and throwing them away; and have, accordingly, by some authors been placed at the bottom of the scale of animal life, as deficient in natural affection; but this want of maternal instinct is more apparent than real, for the poor mother invariably, if she escapes with her life, returns to pick up her joey, as soon as the coast is clear; having probably cast it away for a time in order to preserve both their lives, knowing that the pursuers would neglect its slender form in their eager chase of herself, who, temporarily relieved of her burden, could also more readily escape; so that, in reality, it is true affection, and not the want of it, that prompts the old kangaroo to act in the apparently unnatural manner peculiar to her race.

The great red kangaroo (*Macropus major*, or *laniger*) is the largest species of the Macropidæ at present known to exist, and is also the handsomest of the Australian mammalia. Its general colour is sandy-red, tinged with orange, which in the female, and young of both sexes, is changed into a light mouse-colour; its length, from the tip of the nose to the extremity of the tail, is eight feet, of which the tail itself measures three, and is proportionably muscular; the female, as generally happens among the kangaroos, is considerably, almost a third, smaller than her mate. This species is confined to the interior and eastern portions of the continent, and is remarkably swift. The adult male occasionally attains a weight of two hundred pounds avoirdupois.

The great grey kangaroo, although distinguished by the specific term *giganteus*, is not quite so large as the preceding, but is more generally diffused, its habitat extending from the north of Queensland to the southern extremity of Victoria; and as far, in a westerly direction, as South Australia; it is also to be met with in Tasmania, and is probably the animal referred to by Cook, in his account of his voyages, to which reference has been already made. As its name would indicate, this species is of a uniform greyish-brown, passing into a grisly-grey on the under surface; the face, paws, feet, and the tip of the tail are black. This species, which is often hunted in Tasmania, where it not unfrequently leads the hounds an exciting chase of eighteen or twenty miles, or even more, inhabits low grassy hills, and plains skirted by open forests, to which it retires for shelter from the heat of the sun.

The bridled kangaroo (*M. frænatus*) is a native of the southern and central portions of the Australian continent, and is an elegant little species, weighing from ten to fifteen pounds. The general tint of the fur on the upper surface is grey, while the under parts are white; it owes its specific appellation to two white bands which extend from the occiput backwards over the shoulder on each side, and from the tip of the muzzle to beneath the eye. It inhabits dry mountain ridges entirely destitute of water, and quenches its thirst with the dew that generally falls in such abundance during the night in Australia.

The nail-tailed kangaroo (*M. unguifer*) is a very elegant animal, measuring about four feet in length. In this species the tail is terminated by a tuft of long black hair, in the centre of which is placed a thick black nail, very closely resembling in shape and general appearance that of a human finger! The colour of this animal is a yellowish-buff; but it seems to be scarce, and little is known, with certainty, as to its habits, or the extent of country in which it is found.

(*To be continued.*)

LIST OF ASSISTING NATURALISTS.

[*Continued.*]

LEICESTERSHIRE.

Leicester.—Mr. H. E. Quilter, 31 Twycross Street, Highfield. *Geology.*

Leicester.—Mr. George Robson, 91 Cranbourne Street. *Phanerogamic Botany* and *Coleoptera.*

EARLY HISTORY OF THE DIATOMACEÆ.

By F. KITTON, HON. F.R.M.S.

SOME few months since we gave a short résumé of Ehrenberg's "Infusionsthierchen" (so far as the Diatoms were concerned). In that article we dwelt more particularly upon the arrangement and classification of those organisms. We now propose to lay before the readers of SCIENCE-GOSSIP a résumé of the views of a celebrated naturalist of a somewhat earlier period, in which he gives what may be called a life history of some of these forms. This history was published in a little work (a small square octavo) entitled the "Almanach des Carlsbad," 1835. This was not, as we understand the term, an almanac containing a calendar, changes of the moon, &c., but partook more of the nature of a literary and scientific annual and contained articles written by various authors. That which we have now to introduce to the reader was written by Mr. Augustus Joseph C. Corda, a well-known naturalist and the author of several works connected with the Cryptogamia; his principal works were "Icones Fungorum, hucusque cognitorum," "Prachtflora europäischer Schimmelbildungen," "Beiträge zur Flora der Vorwelt." He was born at Reichenberg in Bohemia in 1810, and was made curator of the Zoological section of the museum at Prague in 1834; he travelled in Texas in 1847–9, and died at sea in 1849, thus dying at the early age of 39, his great contemporary Ehrenberg surviving him nearly 40 years. The contribution to the above-named work was entitled "Observations sur les animalcules microscopiques qu'on trouve auprès des eaux thermales de Carlsbad, par M. A. J. C. Corda de Prague (traduit du manuscrit allemand)." It commences with a short notice of the labours of earlier observers, but to which he very briefly alludes. The forms he describes (Diatoms, Desmids, Oscillarias, and Arthrodias) are unhesitatingly referred to the animal kingdom, and this opinion was doubtlessly the cause of his describing the phenomena that he observes as being the result of the action of certain organs which he imagined he saw, particularly the capability of movement; thus we find the assertion that certain diatomaceous forms were endowed with feet, or what he calls pedal vesicles, and we have no reason to doubt that such assertion was made in good faith. That he really did see any protoplasmic extensions is of course highly improbable, although that something analogous to this does take place is the opinion of many diatomists at the present moment. In the "American Monthly Microscopical Journal," April 1881, is a paper by Mr. J. D. Cox, "On the Motion of Diatoms," in which he records some observations he has made on this subject; he says that he saw a frustule of *Nitzschia linearis* so wedged in the compressor that one end was free whilst the other was fast. The free end would move vigorously one way or another in the arc of a circle, but the Diatom was not released. Attached to it were two gelatinous masses, one on each side of the frustule similar in size to those described in a former case (in the case to which he alludes he saw the two masses moving steadily along the frustules from one end to the other, making a momentary halt at the centre; the mass was as large as the width of the Diatom); these masses acted in a similar manner in the second case. Further on he remarks that he, "from the study of the Diatom shell, has been led to accept the opinion that the raphe is a real fissure in the shell. but in many cases it is not a simple vertical linear opening of the shell. It is more like the overlapping of the edges of curved tiling in a roof, the thickened line of silica borders one lateral half of the shell, while the other dips under it with a thin film; this may be easily seen in some of the large Pleurosigmas."

The cleft which Mr. Corda says he saw at the apex of Pharyngoglossa was possibly a partial separation of the two valves of the frustule. The so-called alimentary canal was the median line, and the apertures the central and terminal nodules, the "plug" however does not admit of so easy an explanation. The sexual conjugation we now know was simply two frustules about dividing. The phenomenon which he relates having seen take place in *Surirella Venus* was no doubt the expulsion of an auxospore; and the so-called mantle, the mucus surrounding it. With these few words of explanation we will now allow the author to speak for himself.

The Habitats of these animalcules.—An attentive observer cannot approach the sources of the thermal waters of Carlsbad and other thermal waters without remarking, on the wood and stone that border the fountains, a green slimy and gelatinous carpet in more or less dense layers (feuilleté). They are seen very developed on the timbers surrounding the Sprudel, on the stones of serpentine that border the Neubrunn, on the water in proximity to the Bernardsbrunn, on the conduits by which the water from the Schlossbrunnen escapes, on the pipes which supply the various bathing establishments, on the rocks, and on the soil of the bed of the Teple, in a word, on every place over which the thermal waters flow. On examining this unctuous and gelatinous mass it is found to conceal myriads of beings elegantly and symmetrically organised, belonging for the greater part to the animal kingdom, and which by their forms, modes of living, and manner of propagation cannot fail to excite the most profound astonishment. It is in this chaos of slimy matter, and which to appearance is lifeless, we find—the eye being armed with a powerful glass—symmetrical forms more varied and elegant than the most facile painter of arabesques could have imagined. Nevertheless, these myriads of forms are animated, exhibiting under the same type an infinite variety of shapes, whose corpuscules are often not more than the $\frac{15}{1000000}$ nearer, I say fifteen million parts of a Paris inch! and rarely exceed $\frac{5}{1000}$ of the same measure; presenting organs simple if compared with animals of a higher order, but equally complicated and admirable in relation to their proper bodies. They move and have sensation for their conservation and propagation, generally possessing the means of assimilating heterogeneous matter, and retaining their vitality for some time when placed in conditions unusual to their nature.

Warmth, solid matter in the water, and incipient putrefaction, seem to be indispensable to their production and propagation; we always find them when these conditions are combined.

Without moisture they cannot continue to exist; solid matter and humidity when in contact according to physical laws produce heat, and it is only by the simultaneous action of moisture and heat that putrefaction is possible. When we sometimes meet with these animalcules in the foam of streamlets and rivers, they have not been engendered there, but brought by the current.

To be able to examine these aggregations of animals, we collect by means of a knife the green matter, and place it in a wide-mouthed glass, filled with the water in which they lived, or, in default of that, in water from a river.

The microscope destined for their examination must show the objects clearly and much magnified. Those of Pister and Schick of Berlin, Plossl of Vienna, and Chevalier of Paris are the best, and magnify from 1000 to 3000 times. Those that do not magnify more than 500 or 600 times will not serve for these researches. To examine this green matter we place a small piece about the size of a pin's head on the glass disc of the stage and tear it in pieces with two pointed instruments, or with pins, and moisten the fragments with a drop of water. We now examine it with a power of 100 to 200 times, in order to observe their forms more distinctly. Where the animalcule is distinctly recognised, it must be allowed to remain undisturbed under the instrument, and then examined again with a power of 400 to 600 times. It is only after having become familiarised with its form and habit that we can proceed to those researches we have in view.

After having acquired by numerous trials a certain dexterity, we proceed to the anatomy of the animalcule; this can be done in two ways. The first is very easy and simple: we take a piece of very thin glass (thin as paper) which we place over the animalcule, which will be flattened by its pressure and will remain so during the examination.

The second requires considerable dexterity, and consists in separating the larger species by means of a very sharp pointed needle, a proceeding requiring a very acute eye, and patience; perseverance is required in all kinds of investigations, but more particularly so in microscopic observations, which require to be repeated and varied, but this trouble is amply rewarded by the discovery of new and beautiful forms of which we have never dreamt, or which have previously only been vaguely figured, and cause a pleasure inexpressibly sweet and gratifying, (*un plaisir ineffable et les plus douces jouissances*).

Forms and organs.—By means of the organisation of those animalcules we are able to divide them into two classes and to subdivide them into six families, viz. the *Naviculæ*, the *Cosmariæ*, the *Euastreæ*, the *Closteriæ*, the *Fragilariæ*, and *Arthrodiæ*. The three first families have a brittle (*fragile*), and the other a flexible integument (Corda's reason for placing the Fragilarias in the latter class was, no doubt, on account of the flexibility of the filament, although it is somewhat contradictory to place a genus called Fragilaria on account of its fragility, in a class distinguished by its flexibility. F.K.), but in order to recognise the form of these creatures, it is necessary to describe all the organs of which they are composed. The external integument (epidermis) of these animalcules is of two kinds; one is a siliceous shell, transparent and glossy, and which is termed the cuirass (lorica), or the cuirass is absent and the epidermis is naked.

The cuirass, in t' e majority of these animalcules, resembles the shell of the mussel, and is composed of one or two transparent siliceous plates which enclose the animal. The univalve cuirass is a single plate (feuille) rolled on itself (the forms Corda calls univalves are *Epithemia*, *Navicula*, *Fragilaria*, *Syrinx*, &c., F.K.). When the edges coalesce the whole of the animalcule is covered, excepting where there are a few small apertures. This cuirass appears to be either smooth, as in *Frustulia appendiculata* (fig. 5), or grooved, as in *Navicula costata* (*Epithemia Westermannia*. F.K.), where the grooves radiate from the umbilicus which is placed on one side of the centre of the cuirass or simply at the side; this umbilicus is sometimes large and elevated, as in *N. costata*, the sides of which are furnished with cilia. In Navicula and Frustulia the cuirass is smooth on the lower surface (partie inférieure), and is usually quadrangular or parallelogrammic; this is called the pedal surface, and by which the two animalcules always adhere (fig. 9).

In the Diatoms, e.g. *D. fenestratum* (fig. 10), the cuirass is flattened and crenate at the margins; the

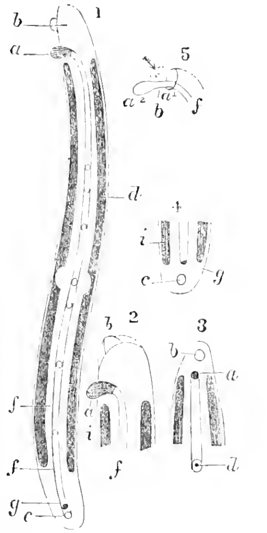

Fig. 4.—*Pharyngoglossa sigmoidea* (Corda). 1. *a*, plug to canal; *b*, head; *c*, anal termination; *d*, sexual protuberances; *f*, intestinal canal; *g*, anus. 2. Head (side view), *a*, plug; *b*, cleft in cuirass with foot protruded; *f*, intestinal canal; *i*, contents. 3. Head (front view), *a*, plug; *b*, foot; *d*, sexual excrescence. 4. Posterior extremity; the letters refer to the same parts as in 2. 5. a^2, plug protruded through aperture a^1 and beyond the canal *f*; *b*, the part surrounding the ligament to which it is attached.

Fig. 5.—*Frustulia appendiculata* (Corda).

Fig. 6.—*Frustulia viridescens* (Corda). *a a*, pedal organs.

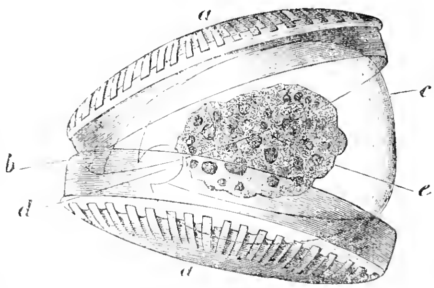

Fig. 8.—*Surirella Venus* (Corda), = *S. striatula* (Ehr.) *a*, *a*, cuirass; *b*, hinge; *c*, mantle; *d*, notch or slit in interior membrane; *e*, contents brown or green.

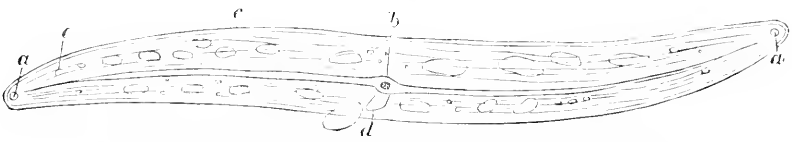

Fig. 7.—*Scalptrum striatum* (Corda). *a a*, pedal organs; *b*, central opening passing through the brown contents *d*; *e*, longitudinal rays between the sides *c* of the cuirass.

part also where the animals cohere has a narrow surface at the point of union. The form of the bivalve cuirass always conforms to that of the animal.

The cuirass of *Surirella* is not a single piece, but opens in the direction of the length of the animalcule (fig. 8). Each valve has the form of a plate, and which fit into each other in a peculiar manner by means of a species of hinge, very much resembling a round tobacco box. On the margins are a series of elevations and depressions of equal size. In *Surirella*, *Navicula*, *Closterium* and *Cosmarium*, the epiderm lines the whole internal surface of the cuirass, forming a sac.

In *S. Venus* the epidermis is manifestly endowed

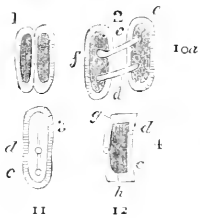

Fig. 9.—*Frustulia agrestis* (Corda), two animalcules united. 10*a*, do. do. *e*, *f*, upright and apart; *c*, *d*, the canals uniting them. 11. View of pedal surface; *c*, *d*, apertures in the same, canals withdrawn. 12. Side view; *g*, *h*, two small openings at the ends (not seen in the figure); *c*, *d*, openings for the canals.

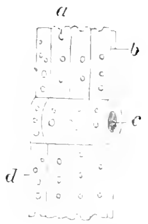

Fig. 10.—*Diatoma fenestratum* (Corda). *a*, colouring matter contained in the cells of *d*; *b*, side view; *c*, intestinal tube common to the series of animals.

with muscular power, as we see when the sac opens, it also opens the valves, and when it contracts it closes them.

Organs of Movement.—The movement of these animalcules is produced by very simple organs where they exist, or by the whole body.

When describing the cuirass and mantle, I spoke of the feet protruding through the apertures in the cuirass, and of those formed by the elevation and extension of the mantle. These feet cannot be easily seen; but in the large species of Navicula and Frustulia, they are distinctly visible. In *Pharyngoglossa sigmoidea* (fig. 4) above the plug *a* is a longitudinal cleft, through which the foot *b* is protruded; a similar foot *c* is seen at the posterior end of the body, at the termination of the intestinal canal.

In *Frustulia viridescens* (fig. 6) these feet are plainly discernible. In *Scalptrum striatum* (fig. 7) we find two openings *a*, *a*, near the extremities of the body, and one *b* in the centre.

Movement in the animalcules is rarely produced by vesicular feet. The Naviculas and Frustulias swim by a very gentle movement of the whole body.

The Frustulias move at the rate of a line ($\frac{2}{23}$ of an English inch) in from 15 to 20 seconds. This is much faster than Smith states it to be ("Synopsis," vol. i. p. xxiii). He gives the rate of progress as follows: *Bacillaria paradoxa* $\frac{1}{200}$, *Pinnularia radiosa* $\frac{1}{3400}$, *P. oblonga* $\frac{1}{2000}$, *Nitzschia linearis* $\frac{1}{2500}$, and *Pleurosigma*

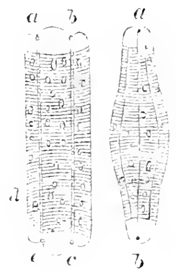

Fig. 11.—*Syrinx annulatum* (Corda), frustule and valve; *a*, *b*, intestinal tube; *c*, cuirass; *e*, annular folds; *d*, contents.

strigosum $\frac{1}{2400}$ inch in one second of time. Our river Diatoms scarcely move at all, but those living in the sea are much more lively.

(*To be continued.*)

Pulex irritans.—F. Farrant makes some inquiry about fleas. When I was a boy we were rather interested about fleas, and so put three or four into a glass tube with a little cotton wool at one end; they fixed their eggs singly to the wool, and we used to feed them by taking the cork out, and putting the open end on the back of the hand, when the fleas would come down to feed. In some parts, where fleas abound, it is not pleasant, but not uncommon to find the grubs in the blankets. From specimens I have mounted for the microscope each flea will lay five eggs at a time. Talking of fleas, I would remark that African ones are darker coloured than English ones. Their apparatus for piercing and sucking is well worth noticing, but requires rather a high power to see with.—*Edward Thomas Scott.*

Cormorants.—In this neighbourhood there is a beautiful lake, Lough Owel, and upon a very small and nearly submerged island near Mount Murray, indeed close to the lawn, are a few alder-trees; upon these we have counted upwards of thirteen cormorants at one time, perching upon the stunted trees and giving them a most singular appearance. Lough Owel is about sixty miles from the sea.—*F. I. B.*

NOTES FOR SCIENCE CLASSES.

THE chief instruction given in our popular Science Classes is intended to be practical; a few hints to students will just now be welcome. Blackboard illustration is no doubt useful in its place, but if the student can see an actual specimen under the microscope, and have each part of the section carefully explained (all the better if the section can

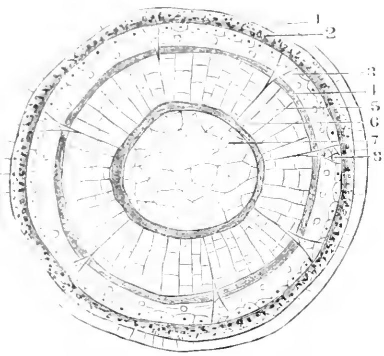

Fig. 12.—Transverse Section of Lime-twig. 1. Epidermis, formed of minute cells, without chlorophyll. 2. Cortical ground-tissue, containing chlorophyll. 3. Phlöem, composed of hard and soft-bast. 4. Cambium, very bright-looking cells; this often disappears in roughly-cut sections. 5. Xylem, formed with spiral and dotted vessels, or the first year's ring of wood. 6. Medullary sheath, immediately surrounding the column of pith. 7. Pith, composed of ground or fundamental tissue. 8. Medullary ray, crossing the xylem, and ending with a wide opening in the phlöem.

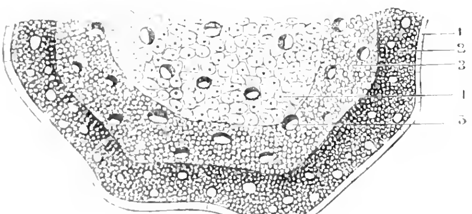

Fig. 13.—Transverse Section of *Ruscus* stem. 1. Epidermis. 2. Cortical layer of ground tissue. 3. Sclerenchyma; observe this part with care, and compare it with section of Pteris. 4. Ground or fundamental tissue. 5. Fibro-vascular bundle scattered amongst the ground tissue; observe the xylem, always towards the centre of the stem. Also, trace out from a very highly-magnified fibro-vascular bundle the same parts as in Lime.

be made in the class-room in his presence), then work it all out at home by reading a good text-book, the subject then becomes intensely interesting; such students are not only content with making a good position in the examination, but it becomes a life-long study. Our notes are intended merely to make the subject plain and simple, so that it may have general interest, and to fill up a felt want in most text-books in use at the present time; therefore we have marked each distinct part in the following sections, and give the names of the different portions as understood in our present advanced state of the science, and as specially indicated in the syllabus. To know each part, and tell where to find it, is the key to its structure, and if our readers will practically work out the three stems described, they have made a firm step towards success.

The specimens selected are the best for the purpose, and can be found in every district.

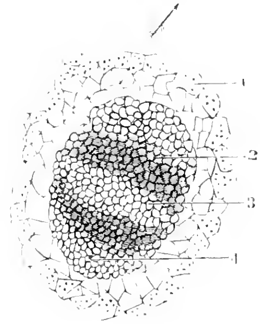

Fig. 14.—Vascular bundle of *Ruscus*. 1. Ground tissue. 2. Xylem. 3. Cambiform tissue, or soft-bast. 4. Hard-bast, or bast-fibres.

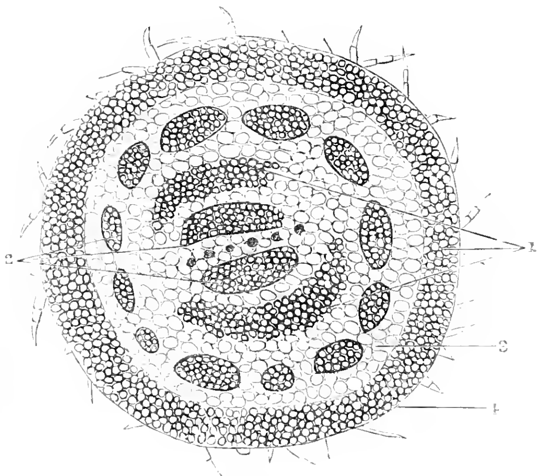

Fig. 15.—Transverse Section of Rhizome of *Pteris*. 1. Sclerenchyma; this is a brown cellular tissue in three distinct layers. 2. Fibro-vascular bundles; here note position and structure as pointed out in the next engraving; but in the entire section, by means of a low power, they should be first studied. 3. Ground tissue. 4. Epidermis.

The first is a section of the lime-tree, and is a guide to the structure of all Dicotyledonous stems. First, trace out in an actual specimen the position of the fibro-vascular ring, in the following order, viz., Phlöem, Cambium, and Xylem, commencing from the epidermis, then trace them out in the same position in the butcher's-broom (*Ruscus aculeatus*, L.) stem, and so on with the common brake-fern (Pteris). Second, examine carefully the Phlöem of the lime.

Note its formation: the layer next the cortical ground tissue is composed of bast-fibres, or hard-bast; observe its appearance; adjoining this is soft-bast; or the phlöem is made up of hard and soft-bast. In the butcher's broom it is very distinct, the bright-looking portion is soft-bast, and the darker part bast-fibres; all the difficulty will vanish in the longitudinal sections we purpose giving next month.

The numbers in the lime section refer to fig. 12.

Fig. 13 explains the section of the stem of the butcher's-broom.

Now we come to a section of the stem of an

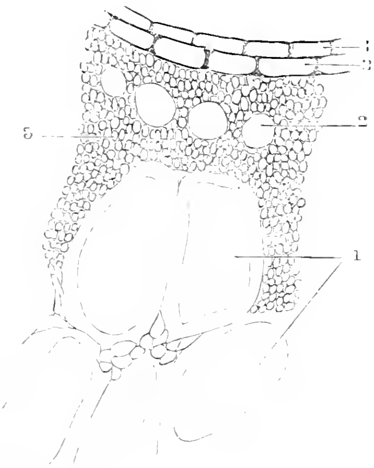

Fig. 16.—Part of Vascular bundle of *Pteris*. 1. Xylem in the centre of the bundle, formed of scalariform vessels. 2. Sieve-tubes. 3. Phlöem, surrounding the xylem, though encircled by 4, or bundle-sheath. 5. Packing parenchyma, or ground tissue.

Acotyledonous plant (fig. 15); note the important difference from the Ruscus, which is a Monocotyledon.

The fern stem has an important structural composition; the annexed numbers should be read up for home lessons (fig. 15).

Now observe the fibro-vascular bundle of Pteris more highly magnified (fig. 16).

(*To be continued.*) R.

HERONS.—I was lately laughed at by an eminent naturalist for believing the country people when they told me that herons sit upon their nest with a leg hanging down at each side. My son coming home on leave from Alderney tells me he met there an excellent amateur naturalist who collects and stuffs birds, and lately pointed out to him a specimen of the great northern diver approaching the island. This person told him he had frequently seen herons hatching their eggs in the above-mentioned strange position, and that my informants were perfectly correct.—*F. I. B.*

HISTORY OF THE PEAR-TREE (*PYRUS COMMUNIS*).

By H. G. Glasspoole.

[*Continued from page* 254.]

JOHNSON, in his improved edition of "Gerard's Herbal," in 1596, adds: Most of the pears are at this day to be had with Mr. John Miller in Old Street, in whose nursery are to be found the choicest fruits this kingdom yields. Shakespeare mentions only two varieties of pears in his plays, the warden and popering, and from him we find that the first named was used in pies, as the clown in the "Winter's Tale" says: I must have Saffron to colour the warden pies (Act iv. s. 2). This fruit was also known by the name of the Lukeward's pear, as perhaps the time when it was fit for gathering was near St. Luke's Day (18th of October). The popering pear mentioned in "Romeo and Juliet" (Act ii. s. 1), and described by Parkinson, is most likely of Flemish origin, may have been introduced by the antiquary Leland, who was presented to the rectory of Popeling. situated in the marches of Calis by Henry VIII. (1530); vide "Plant-lore of Shakespeare." There appear to have been about two hundred and fifty varieties of pears known in Philipo Miller's time (1724) from which he selects seventy or eighty, as the best. During the last one hundred years great changes have taken place in the cultivation of this fruit, and the varieties which now grace our tables are far superior to those which our forefathers delighted to honour.

Most of our fine pears are of continental origin; the horticulturists of France and Belgium in former years paid more attention to this species of fruit than those of England. Belgium, indeed, has been termed the "Eden of the pear-tree," for to Professor Van Mons, of Brussels, who devoted a great part of his life to pears and their improvement, having raised eighty thousand seedlings, are we indebted for some of the most finest varieties we possess. The common Begarmot is supposed by pomologists to be one of our oldest pears. The name was formerly written Begarmont princely pear, which, according to Manger, is derived from the Turkish beg, or bey, a prince; and armond, a pear, clearly pointing out its eastern origin. Another ancient variety, and one which is still common in England, is the Bon Chrétien; the origin of its name is thus related by Soyer in his "History of Food." Louis XI., King of France, had sent for Saint François de Paule, from the lower part of Calabria, in hopes of recovering his health through his intercession; the saint brought with him the seeds of this pear, and as he was called at court. Le Bon Chrétien, this fruit received the name of him to whom France owed its introduction. The name of this pear has been corrupted by popular English nomenclature from Bon Chrétien to Boncrutching. One of the sub-varieties of this fruit is known as the William pear. Amongst our old best autumn pears stands the Jargonelle, which, Mrs. Bernard states, consists of little more than eau sucrée enclosed in a rind; the analysis of De Candolle showing that when ripe, it contains 83·80 per cent. of water, and 11·52 per cent. of sugar.

The same authoress informs us, that though we owe both the fruit and its title to France, by some strange *contretemps* the name there is given to quite a different kind. Our Jargonelle is called by the extraordinary appellation of Grosse Cuisse Madame, or great ladies' thighs. The German Frauen Schenkel has the same meaning. The pear as a dessert fruit is generally preferred to the apple; still the latter, according to the old nursery rhyme, "An apple for the king, and a pear for the queen," appears to have taken priority in our forefathers' days. It is also used for baking, compotes, marmalade, &c. Loudon tells us that in France they dry large quantities which remain good for two or three years, and are used for pies, as apples are in England. We do not know for certain if this art of drying pears was practised in the days of the Tudors, but Shakespeare mentions one in his "Merry Wives of Windsor." Falstaffe says, "I warrant they would whip me with their fine wits, till I were as crestfallen as a dried pear." (Act iv. s. 5.)

The pear-tree is extensively cultivated in different parts of Worcester and Herefordshire for the purpose of making perry. Dr. Bell tells us that Worcestershire was famous for this kind of fruit at a very early period, for there is a pear orchard at Newland, near Malvern, which is known to have existed more than 400 years. Drayton states in his poetical account of the battle of Agincourt, that the feudal retainers of the Beauchamps, and other great landowners, who vowed suit and service to the crown, bore as their standard in the field a pear-tree laden with fruit. The people of that county have long adopted the pear as an emblem, and at the present day the arms of the city of Worcester are represented by three black pears, known by the name of the iron-hearted. Many pear and apple-trees in this country seem to enjoy a green old age, unconscious of decay. Loudon states that some trees in his time growing at Twickenham, which in all probability were from the nursery of Gerard's "curious and cunning graffer Master Richard Rointer." He also mentions these fruit-trees growing in the neighbourhood of Jedburgh Abbey in good health and abundant bearers, said to be from 500 to 600 years old. Loudon mentions a very extraordinary pear-tree growing on the glebe lands in the parish of Hom-Lacey, which more than once produced enough fruit to fill fifteen hogsheads of perry in the same year. The growth of this tree was also abnormal, for when its branches became long and heavy their extreme ends touched the ground, they took root, and, like the Banyan of India, sent up fresh shoots and became a tree which in due time repeated the process, so that in 1805 nearly half an acre of land was covered by this tree. The coarser varieties of pear, whose fruit has rather an austere taste, are used for perry, which is made much in the same way as cider; it is sweeter than that beverage and is extensively drunk in some places.

Like the apple, there are now several hundred varieties of pears to be found cultivated in the United Kingdom; some of the French varieties have retained their original names, but many corruptions have been produced in their popular nomenclature. Thus the Bon Chrétien is converted into Boncrutching; the Beurré into the Bury, the Chaumontelle into Charmingtel. Some have curious local names, such as bishops' thumbs, &c.

Mr. Robert Holland says in "Notes and Queries" that they have an old variety in Cheshire which, on account of its juiciness (juicy by comparison, for it is by no means as melting as the pears of the present day), rejoices in the elegant sobriquet of Slobberchops.

The pear is not indigenous to America, but, like the apple, an introduced fruit. Since its introduction hundreds of varieties suited to the climate and soil have been produced, so that our European pears such as the Bon Chrétien, Jargonelle and others are considered only second-rate fruit by the Americans. The Channel Islands, particularly Jersey, send large quantities of this fruit to the English market. Those enormous pears, the Great St. Germains, which one sees in Covent Garden market, price thirty-six shillings each, come from these islands; also the early Jargonelle, Bon Chrétien, Jersey, Louise, Bonne and the Chaumontel have been known to fetch £5 per hundred. Botanically, the pear belongs to the Rosaceæ family, and is closely allied to the apple-tree, from which it is distinguished by its pyramidal form of growth. In its wild state it is rather a small tree, with an inclination to become thorny; its leaves are ovate and serrated, smooth without glands. The flowers are rather large and a pure white. Under cultivation the thorns disappear, and fruit buds are formed instead; its leaves are less sharply serrated, sometimes only crenated, and frequently almost entire. The timber of the pear-tree is of a yellow colour. Gerard says the timber of the wild-pear is very firm and solid, and good to be cut into moulds. The plates for his Herbal were cut out of this wood, as were, says he, breast-plates for English gentlewomen. In the present day it is much used by the turners and pattern makers; the blocks with which the designs for floor-cloths are painted are made from pear-wood. When dyed black it can scarcely be distinguished from ebony. Handles for carpenters' tools, measuring rules, &c., are made from this wood. The wood of the pear makes excellent fuel, gives out an intense heat with a bright flame. The leaves dye yellow, and may be used to give green to blue cloths.

The name Pyrus is derived from the Celtic Peren, and to this most of the European names of the pear may be traced.

A GEOLOGICAL EXCURSION TO SWITZERLAND.

By Dr. Rudolf Haeusler.

As I have been several times requested to draw up a plan of a geological excursion to Switzerland, to be accomplished in the shortest possible time, I may answer many questions at once by sending these few lines to your widely-read paper.

The pursuance of this plan in a longer or a shorter time depends entirely upon the mode of travelling, but I think a fortnight might be quite sufficient to allow the geologist to see the most interesting geological features of the country.

As it would be quite impossible to give a full description of the geology of the mentioned localities, I prefer to name chiefly the characteristic fossils which are the most likely to be found, and which will suffice to prove the presence of the different strata. Their geological features may better be seen than described in a few words.

Arriving at Zürich, a visit to the large museum of the Polytechnikum gives a good general idea of the characteristic geological formations, the principal fossils and their mode of preservation in strata of the same age at different localities. The museum contains, besides, an almost complete collection of Swiss jurassic Alpine cretaceous and tertiary fossils, and is celebrated for its fishes from the Glarus slate, Oeningen plants, &c. The Wasserkirche contains the museum of objects from Swiss lake-dwellings, and is by far the most complete collection of this kind.

A trip on the Uetliburg shows a splendid panorama of the Alpine chain, the Jura, molasse hills, and Black Forest, the lake and town of Zürich. Zürich itself is built upon glacial deposits, remains of the moraine may still be seen ("Katze" in the Botanical Garden).

A few hours in the afternoon are sufficient to visit the lake-dwellings of Robenhausen and see the collection of Mr. Messikommer. Only at very low water the wooden piles are seen above the surface. The methods of working out the different objects, stone and horn weapons, ornaments, tissues, fruits, &c., is very interesting, showing the manner in which these remains are imbedded in the turf.

Return to Zürich. Take train to Baden. Visit the quarries at the foot of the old castle Stein. The yellowish limestones, belonging chiefly to the upper jurassic zone of *Ammonites bimammatus* are not very fossiliferous, but contain besides large remarkably well preserved hexactinellid sponges, a few cephalopods, brachiopods, &c. The more interesting grey marly limestones near the railway cut (Nationalbahn) representing the zone of *Am. tenuilobatus*, are rich in cephalopods, of which the planulate (Perisphinates) are the most numerous. In the railway cut or on the opposite side of the river, in the vineyards of the Lägern (between Baden and Wettingen), the following fossils, which are almost sure to be found, will indicate the presence of this interesting zone: *Am. polyplocus*, *A. Lothari*, *A. iphicerus*, *Rhynconella lacunosa*, *R. triloboides*, *Cidaris coronata*, &c. &c. They are partly crowded with sponges. The highest part of the mountain near Baden is formed by the younger "Wellingerschichten," with flints and silicified fossils. Some of the characteristic species are *Am. eudoxus*, *A. mutabilis*, *Rhabdocidaris maxima*, which reaches here the size of a cocoanut, *Cidaris propinqua*.

On the north side of the Lägern, between Baden and Ehrendingen, most of the subdivisions from the upper Trias to the upper Malm may be seen, but the rocks being mostly covered by alluvium, it is not very easy to find them.

From Baden take rail to Brugg, where a stay of two or three days should be made, to see some of the most interesting localities of the Jura.

Mount the Bruggerberg. The mountain is built up of marine and freshwater molasse and conglomerates (Nagelflue). By the action of the water the soft freshwater sandstones were removed, and large caves were left of which the Bruderhöhle is the most remarkable. Walk down to the village "Villnachern," and take a boy as guide to the Kalofen, an extensive quarry in the exceptionally reddish marine molasse, where already the Romans used to break their millstones, of which several broken pieces are still to be seen.

ON THE EGG OF *RUMIA CRATÆGATA*.

In his treatise, "Ueber die Micropyle und den feinern Bau der Schalenhaut bei den Insekteneirern," Leuckart describes the general characters of the eggs of Lepidoptera (p. 166), as follows:—"The eggs of Lepidoptera are very generally of a short and depressed (gedrungenen) more or less spherical form; often also flattened at the hinder end, by which they are attached (to leaves, twigs, &c.), hemispherical or even lens-shaped. All distinction between dorsal and ventral side is constantly absent.* . . . The micropyle is always complex: it consists of a variable number (mostly of 4–6) canals, which radiate from a common central pit in the anterior pole, through the investments of the egg.

* "Ein Unterschied zwischen Rücken- und Bauchfläche fehlt beständig."

The surface of the chorion is more or less distinctly areolated, especially at the anterior pole where the areolæ constantly compose an ornamental and rich rosette around the central pit." The so-called front or upper pole of the egg, or its cephalic end, is that end which, lying remotest in the ovitube, is last laid; and in which the head of the future embryo will be found. In eggs of an elongate shape the tail of the embryo often occupies the opposite, lower, or hinder, pole of the egg, the first laid end, by which the egg is sometimes attached to the leaf or branch in an upright position. Describing the egg of *Musca vomitoria*, Herold says ("Disquisitiones de Animalium vertebris carentium in ovi formatione;" description of Pl. xiii.): "By reason of its curved shape, four regions or surfaces may be discovered in every egg. The convex surface under which the venter of the maggot is developed may be called the *ventral* region; the opposite concave side, distinguished by a slit, the *dorsal* region, under which the dorsum of the maggot comes to lie, and which at the laying of the egg has a position fully parallel with the back of the fly. The two surfaces lying between these regions, corresponding to the two sides of the maggot, may be called the *right* and *left lateral* regions. As results from the foregoing, the lateral regions and the ventral region of the egg correspond exactly in position with the same regions in the fly at the moment when the egg is laid." In the case of lepidopterous eggs however the embryo is frequently doubled up in a U-shape, so that the head and tail lie close together in the front end of the egg. The egg of *M. vomitoria* is an instance of perfect bilateral symmetry. It is the only radially symmetrical or even spherical form of lepidopterous eggs, which makes it (nearly) always impossible, as Leuckart states, to distinguish between dorsum and venter, and right and left sides. The egg of *Rumia cratægata*, however, furnishes at least one exception to this rule.

In the end of June last I received a box containing a dead female of this moth, together with about eighty eggs which she had laid in it after her incarceration. They were scattered about in rows of two or three to eight or nine, and sometimes one row on the top of another. The egg may be described as of a short oval shape, truncated anteriorly (at the front pole or cephalic end), and laterally compressed; pearly white, iridescent, speckled coarsely and sparsely with irregular spots of a bright red. They were in various stages of development when I received them, and the doubled up horseshoe-magnet-shaped larvæ were in many plainly visible through the transparent shell. Whether or not (at the moment of laying) these eggs occupied what may be called the normal position, as described above by Herold, they were all now lying on their sides (right or left indifferently); those in the same row of course having their cephalic ends all in the same direction. Each egg was about ·75 mm. long, and ·5 mm. in its broadest diameter (i.e. dorso-ventral). The general shape closely resembles that of *Sphinx ocellata* as figured and described by Herold (loc. cit. Pl. viii. fig. 1, &c.), which eggs also lie on their sides. The whole surface is covered with a beautiful hexagonal reticulation with dotted fields and elevated boundary lines, due to the juxtaposition of the cells of the outer layer of the chorion. These hexagonal areolations pass gradually into others of a lozenge or leaf-like shape, surrounding in a double rosette a little pit in the centre of the upper pole or flattened end of the egg, and pointing out the situation of the micropyle.* This rosette resembles closely that of *Euprepia* (*Chelonia*) *Caja*, as figured by Leuckart (Pl. iii. fig. 9), with which I have also compared it. But the upper pole of the Rumia egg has another structure. This is an elevated angular ridge surrounding the whole polar area and giving the appearance of a lid to that end of the egg, especially just before hatching. The opening, after the caterpillar has escaped, corresponds pretty accurately with the area so enclosed; so much so that until I found one eating its way through it I always expected to find the burst-off operculum. Leuckart describes a similar peculiarity in the egg of *Gastropacha neustria* (p. 173 and Pl. iii. fig. 5). "The eggs of *Gastr. neustria* show yet greater peculiarities . . . especially in their external shape. In the hitherto mentioned species of this genus [viz. *quercus*, *potatoria*, *dumeti*], the eggs are globular, or even depressed in the direction of the antero-posterior axis as in the case of *G. dumeti*; here, however, in *Gastro. neustria*, we have eggs of a conical form, flattened in front where they are furnished with an elevated border (wulstigern Rande), narrowed posteriorly and laterally compressed in a marked degree." This border ridge, judging by the figure, is not so sharply defined in *G. neustria* as in *R. cratægata*; but Leuckart describes also an inner concentric ridge (Ringwulst) in the former which is wanting to the latter egg.

The polar area in the egg of *R. cratægata*, with its surrounding elevation, is ellipsoidal—rounded at one end, but running out in a sharp point at the other. Its longer axis corresponds with the greatest width of the egg, and the pointed end runs down a little on the adjacent side. This pointed end of the ellipsoid indicates the position of the head, as the rounded end does that of the tail, of the future larva, which, when developed, lies doubled up within the shell, with its dorsum external, in the manner figured of *Pieris brassicæ*, by Herold, in Pl. xii. figs. 3, 4, and 5. There is consequently complete bilateral symmetry in the egg of *Rumia cratægata*, and the position that is to be occupied by the different parts of the future

* If the hexagonal meshes of a net surrounding an opening in it were strung upon an elastic thread, and this thread should then forcibly contract so as to close the opening, it would give a somewhat similar shape to the adjacent meshes.

embryo can be definitely pointed out in the new-laid egg, a condition which appears to be rare in the case of lepidopterous eggs, and so far as I know unique.

J. A. Osborne, M.D.

Milford, co. Donegal.

MICROSCOPY.

Mounts for Diatoms.—A blue glass cover gives monochromatic light into the object glass, a clearer image, and better resolution with object-glasses badly corrected for chromatic aberration. A blue glass slide, or a thin blue bottom to a cell, gives the same light *on* an object, and might replace the inconvenient sulphate of copper cell. With either blue cover or slide, stronger light is necessary than with ordinary glass.

Recipe for Mounting Infusoria, Algæ, &c.—Wood vinegar S. G. 1·04, 100 parts, salicylic acid 1 part. For Algæ, of this "salicylic vinegar" and of glycerine each 1 part, and water 20 parts. For Infusoria, S. V. 1 part glycerine 10, water 40 parts.

Hollow Glass Illumination.—Mr. Kitton's paper about using a hollow glass sphere as a condenser for microscopic illumination is very interesting. Will he kindly state where in London such a globe can be procured? Some parts of his description are not very clear to those to whom the idea is quite a new one. His solution of sulphate of copper must of course tinge the light with colour. I should like to know if it would suffice to fill the globe with plain filtered water. Also, when the mirror was turned off and a black field produced, the illumination must have been by direct transmitted light upon the object, and not by reflected light from below. Lastly, the directions about adjusting the lamp ascending to the letters C, B, A, are not quite intelligible. If Mr. Kitton will favour us in your next issue with a few additional explanations, I dare say he will oblige others besides—*H. B. D.*

Quekett Microscopical Club.—The October journal of the above club contains the following papers: "Williams' Microtome, adapted for use with Ether as the Freezing Agent," by J. W. Groves, F.R.M.S.; "On the Gustatory Organs of the Rabbit's Tongue," by T. Charters White, M.R.C.S., &c. (President); "On an Undescribed Species of Sponge of the genus *Polymastia*," by B. W. Priest; "The President's Address," by T. Charters White, M.R.C.S., &c. &c.

Wax Cells.—At a recent meeting of the Manchester Microscopical Society, the President (Mr. John Boyd) described a new method of making cells of wax for mounting opaque and transparent objects; and urged for their adoption that, as it takes no more trouble to make a thick or deep cell than a thin or shallow one, it is a very expeditious method—no waiting for varnish to dry before we can apply another coat. Again, the cell is not soft enough to crush by ordinary accident, and the tenacity of wax will enable it to withstand any ordinary blow without removing the cover, which is a great advantage over the ordinary cement cell.

The Postal Microscopical Society.—We are pleased to find from the eighth annual report of this very useful and cosmopolitan society that it is in a state of flourishing good health, and likely to continue doing good, thanks to the able management of the Hon. Secretary, Mr. A. Allen. The President's Address (which is printed in full) is most excellent reading. A plate of a "Tadpole Slide" and a "Simple Section Cutter for Beginners" prefaces this year's Report.

ZOOLOGY.

Deaths from Wild Animals in India.—The total number of persons killed by snakes and wild beasts in the several provinces of India during 1880, has gradually increased from 19,273 in 1876 to 21,990 in 1880. The largest number of deaths occurred in Bengal and the North-Western Provinces and Oudh, in which provinces the deaths during the year aggregated 11,359 and 5,284, respectively. In Bengal 10,064 deaths were caused by snake-bites, and 359 persons were killed by tigers; while in the North-Western Provinces and Oudh, 4,723 persons died from snake-bites, and 265 were killed by wolves. The total number of persons killed by wild beasts and venomous snakes during the years 1879 and 1880 was—

	In 1879. (Exclusive of the deaths in Mysore.)	In 1880.
By wild beasts	2,890 ..	2,840
By venomous snakes ..	17,266 ..	19,150
Total ..	20,156 ..	21,990

The increase was common to all provinces, except British Burmah. The number of cattle killed increased from 54,830 in 1876, to 55,911 in 1879, and 58,386 in 1880 (exclusive of the figures for Mysore, where the deaths in the previous year amounted to 5,899). The increase compared with 1879 is common to all provinces except the North-Western Provinces and Oudh, the Punjab, and Ajmere-Merwara. In the North-Western Provinces and Oudh, the totals for the two years are nearly the same, and in the Punjab there was a decrease of about 1,200 in the number of cattle killed. The total number of wild animals destroyed has fallen year by year from 23,459 in 1876 to 18,641 in 1879, and 14,886 in 1880. As compared with the previous year, the falling-off was common to all provinces, except the Central Provinces, Coorg, and Berar. The most remarkable decrease occurred under the heading "other animals" in the Madras presidency, the figures for 1879 and 1880 having been 2,956 and 139, respectively. The number of snakes shown as destroyed was 211,775, as compared with 131,927 in the previous year, the increase being mainly due to the very large number (177,070) of snakes which were killed in the Bombay presidency. The total amount of rewards paid for the destruction of snakes was Rs. 11,663, as compared with Rs. 7,663 in the previous year. It is chiefly in towns and villages that the destruction of snakes is desirable, and for this reason it is satisfactory to observe that so many municipalities are now beginning to offer rewards. These results are not regarded as satisfactory, because the falling-off in the number of wild animals killed has been accompanied by an increase in the destruction of men and cattle. The Government of India attributes this to the operation of the Arms Act, although the reports assert that licenses are freely granted in tracts where wild animals abound.

Provincial Museums.—A thoughtful and suggestive paper on "The Functions of a Provincial Museum" has just been read before the Chichester and West Sussex Natural History and Microscopical Society, by the Rev. H. Housman.

A Parasite from the Centipede.—In the few books on microscopic objects to which I have access, I have not been able to find any drawing of or reference to a parasite which I discovered on a centipede.

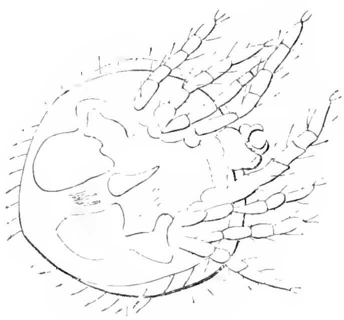

Fig. 17.—Parasite of Centipede (× 60).

I secured a centipede which was found under a flower pot in my garden, intending to mount portions of him for the microscope, and as a preliminary I put him "to steep" in an ointment pot with some *liquor potassæ*. I did this without in any way examining him. On the following day I uncovered the pot to have a look at the centipede, when I was surprised to find twenty or thirty minute dots floating on the solution of potash, two or three of which were removed and put under a microscope with a power of forty diameters. The dots proved to be parasites, of one of which I subjoin a drawing made with a neutral tinted glass. I allowed the rest of the parasites to steep, as they are hard, and have high convex backs. They might appropriately be called turtle backed. The subsequent process I adopted for mounting them pretty nearly ruined them! Pressure, even after maceration for several days in the potash, split the upper and lower "shells" of the parasite, either transversely or at the sides where they are joined by thinner membranes. There can be little doubt that if they could be mounted without pressure they would show to advantage. Owing to the prolonged maceration to which I subjected them, first in potash and then in turpentine, I have been unable to make anything of the mouth of the creatures, and I fear their general structure has been more or less injured. The parasite from which my drawing was made is the best preserved of the seven or eight that I mounted. I enclose a small packet in which you will find some unmounted specimens, but as these were in potash and were cleaned and dried at the same time with the objects I mounted, they too will probably not be found perfect. I shall be glad to be furnished with any information or references on the subject.—*W. S. Simmons* (*Calcutta*).

Natural History, &c., of Jersey.—We hope to resume Mr. E. Lovett's interesting papers on this subject in our next number.

Thalassidroma Pelagica.—During the stormy weather on the south coast on the 28th of November last, a stormy petrel, or Mother Carey's chicken, as they are styled by some, was driven in and took refuge on the West Pier at Brighton, and being much exhausted was easily captured. Another one was also caught on some oyster-beds at Southwick, near Brighton, and has since been forwarded to the Dyke Road Museum at Brighton. The above occurrences prove the severity of the late gales, and it may be interesting to some of your readers to hear of them. —*F. F.*

Dredging in the Mediterranean.—The good work in zoological exploration done with the French Government vessel *Le Travailleur* last year was followed up this year by another expedition in the same vessel, which, well equipped at Rochefort, left that place on June 9, and after a seventy days' cruise in the Atlantic and Mediterranean, returned on August 9. The expedition was organised by M. H. Milne-Edwards, and the naturalists who embarked were MM. A. Milne-Edwards, De Folin (editor of the journal *Les Fonds de la Mer*) and Fischer, and Professors Vaillant, Perrier, and Marion. From a short account of what was done in the Mediterranean, we learn that part of June and the whole of July were devoted to exploring the deeper parts of that sea (largely unknown hitherto). The general result arrived at is that the

Mediterranean is not to be considered a distinct zoological province; most of its animals have come from the ocean, and the more we get to know of the animals off the oceanic coasts of Portugal, Spain, Morocco, and Senegal, along with Mediterranean fauna, the more do differences between the two disappear. In the Mediterranean, near the shores especially, species seem often to have a more active growth and reproduction than in the parts whence they migrated, and the new conditions of life have somewhat modified the external characters. Various interesting types of crustaceans, mollusca, bryozoa, cœlenterata, &c., were met with, many of them found only in the Atlantic before, some corresponding to fossil forms, some presenting a transition between oceanic and Mediterranean fauna, and so on. A new species of galathodes (a crustacean largely represented in the Caribbean Sea) was found at 455m. depth; like its congeners, it is blind. Between 500m. and 2600m. there are found in certain places enormous masses of empty shells of pteropoda and heteropoda. The finding (at depths below 550m.) of specimens of the splendid sea-star Brisinga, which has been thought to tenant only the deep and cold parts of the ocean, was quite unexpected. No infusoria were obtained at great depths; there were few rhizopods, and the finest granulations from the bottom never revealed the presence of bacteria or other minute forms of life. Below 600m. sponges were rare and represented by only two species.

BOTANY.

NOTES ON THE FLORA OF MAIDSTONE AND NEIGHBOURHOOD.—The following is a list of some of the most uncommon plants to be found in this district. *North Downs.—Aceras anthropophora, Ophrys apifera, O. arachnites, Orchis militaris, O. tephrosanthus* and *O. hircina.* (The four last named have all been found on the hills, the monkey and lizard orchids about ten miles from this town.) *O. pyramidalis, O. fusca, Epipactis grandiflora, E. latifolia, Ononis arvensis, Reseda lutea, R. luteola, Helianthemum vulgare, Atropa Belladonna, Viburnum Lantana, Iris fœtidissima.* In Withering's "British Botany," ed. 1841, Wrotham is mentioned as a locality for *Anemone ranunculoides. Banks of the Medway.—Geranium pratense, Symphytum officinale, Saponaria officinalis, Achillea Ptarmica, Lysimachia vulgaris, Bidens cernua, B. tripartita, Petasites vulgaris, Lychnis Flos-cuculi. Woods and fields.—Primula elatior, Neottia nidus-avis, Ophrys muscifera, Epilobium angustifolium.* (The latter grows in a wood near the river, apparently in a wild state.) *Habenaria bifolia, Paris quadrifolia, Geranium columbinum, G. lucidum, Erodium cicutarium, Malva moschata, M. rotundifolia.* I have found *Reseda fruticulosa* in one or two localities, *Melilotus officinalis, Mercurialis perennis, Chenopodium Bonus-Henricus. Digitalis purpurea* grows in many localities in this part of the country. *Cobham* (the locality for *Salvia pratensis* and *Althea hirsuta*) is about twelve miles from Maidstone. I found both of these plants there last year, growing in a waste field near Cobham park, with *Viola tricolor, Sherardia arvensis* and others.—*Henry Lamb, Maidstone.*

MOSS LABELS.—Students and collectors of our moss flora are indebted to Mr. Cash, Coston Park, Manchester, for a Catalogue of our British Mosses, available for labelling purposes. They are uniform with the second edition of the London Catalogue, and are so beautifully and neatly printed that we advise all collectors to obtain them.

DIAGNOSES OF FERNS.—I should be much interested if some of the correspondents of this Journal would send suggestions for a specific diagnosis of a fern; that is to say, their idea of the proper order of the points to be ascertained in identifying a specimen. I am endeavouring to base the nomenclature of my collection on Hooker's Synopsis, and would like to get a well-considered list of diagnostic points so as to fill up the form from the specimen, and then to refer to the Synopsis or any other descriptive work, for identification. For my own use I drew up the following arrangement when commencing the study of ferns. But I am dissatisfied with it, and wish to have it improved and made as full and comprehensive as possible, so that when filled up it may be a complete catalogue, history and description of any and every specimen in my collection.—*A. H.*

SUBORDER..........
Species ....
Locality and Date.

Sori ..... { Form / Position
Capsules ....
Involucre ....
Caudex ....
Stipes......... ...
Frond ... { Shape / Texture
Vernation ....
Desmobryoid .... } Of J. Smith
Eremobryoid .... }
Syn...............
References ....

POLARITY OF MOULDS.—Two months ago I was struck with what appeared to be a novelty to me. The mould forming on exposed lemon juice, when floating upon the surface of some water, was discovered to possess positive and negative properties in a marked degree to bodies placed near it, in the liquid. One piece partaking of a somewhat cordate form, was found to be forcibly attracted by a steel bar, or a match, placed near either of the lobes in the water; whereas the apex was as forcibly repulsed by the same objects. This phenomenon is not analogous to the attraction the sides of a vessel appear to have for a piece of cork, for the positive lobes of the mould were positive to the corresponding ones of other pieces, but negative to the parts not corresponding, in others, to that property. Perhaps some reader could explain this phenomenon. May be it pertains to the dominion of Hydrostatics, or embodies some principle foreign to it.—*George Stocker.*

Notes on the Arbutus.—All who have visited the lovely Lakes of Killarney will not fail to have noticed this beautiful shrub, beautiful at all times with its dark glossy green leaves, forming a charming contrast with the rock on which it loves to dwell, but especially so at this season of the year, when it is all aglow with blushing and ripe fruit peeping out here and there amid the foliage. As to the quality of the fruit it is altogether a libel to call it "Unedo" "one I eat," as if no "one would choose to try a second." Those who have eaten the fruit of the strawberry-tree, ripened under the sunny skies of southern France, will I think agree with me that it is excellent eating, indeed it is not uncommon to have it for dessert at the tables d'hôte of some of the hotels in the Riviera: we propose to dub it "Multedo." The other day I came across an old work which must be at least 150 years old, from which I propose to cull a few notes that may prove interesting. It seems that the arbutus does not grow wild in any other part of Europe nearer to Killarney than the Alps. M. Tournefort observes in his travels that it also grows wild in the island of Candia. The arbutus, saith Sir Thomas Molyneux, is not to be found anywhere of spontaneous growth nearer to Ireland than the most southern parts of France, Italy and Sicily, and there too it is never known but as a frutex or shrub, whereas in the rocky parts of the county of Kerry, where the people of the country call it the cane apple, it flourishes naturally to that degree, as to become a large tall tree. It also does so in Mount Athos and Macedonia, and Pliny quotes it as a thing extraordinary that the arbutus grows to a high tree in Arabia. Doctor Molyneux adds that the trunks of the trees in Ireland have been frequently 4½ feet in circumference or 18 inches in diameter, and that the trees grow to about 9 or 10 yards in height and in such plenty that many of them have been cut down to melt and refine the ore of the silver and lead mines discovered near Ross Castle. The writer continues: "The arbutus which clothes these islands gives even haggard winter the beautiful appearance of spring, for in that melancholy season this tree puts on its highest bloom, which rarely growing in other places, is the more likely to be admired by strangers in this. The preparation of charcoal for the iron works hath been the occasion of a great destruction of this beautiful tree in other parts of the country, and it is said that even here, it suffered much by an accidental fire that laid waste a great part of a forest. Its growth upon rocks of marble where no earth appears and so high above the surface of the water, renders it a matter of both surprise and pleasure. This tree is extremely agreeable in every different circumstance of vegetation, for it hath at one and the same time ripe and green fruit upon its branches, which as they approach to ripeness, from green become yellow, and at length terminate in a fine scarlet colour resembling in form a field strawberry, though in size that of the best garden kind. The blossoms grow in clusters of small white bells, not unlike those of the lily of the valley, and in such great abundance, as in that respect alone to be equal in beauty to the laurustinus and in other respects much superior to it; for the agreeable verdure of the leaves, not much unlike the bay, the scarlet hue of the tender part of the stalk, and all the different stages of vegetation at one and the same time, from the knitting fruit to perfect ripeness, cannot but be exceedingly agreeable to the common observer. Upwards of forty islands in the lakes are covered with an intermixture of these trees and other shrubs, besides at least a fourth part of the ascent of the mountains, the verges of whose bases, like that of Mangerton and others, are washed by the waters of the Lakes." Many interesting inquiries are suggested by this tree. Dr. Cooke writes to me to say that the plants of the arbutus in Kew Gardens have no fruit. Why should it ripen at Killarney so readily and not at Kew, and again why is it found so common in Kerry and nowhere else in the British islands? Let me add one word of caution to those of my readers who may be intending to visit Killarney next year, and who may wish to buy any of the ornaments said to be made from the wood of the arbutus. This wood is very rarely indeed used for that purpose, as it is very difficult to work on account of its extreme hardness.—*John Rasor.*

GEOLOGY.

The Land Plants from the Silurian Slate-quarry, near Corwen.—A paper on this important question has recently been read before the Geological Society by Dr. Henry Hicks. The author stated that since the date of his former paper (Quart. Journ. Geol. Soc., August 1881) he had ascertained that plant-remains occurred in the slaty beds down to the base of the quarry, though much obscured by cleavage. The larger specimens are in the form of anthracite. Mr. Carruthers states that there is sufficient evidence to show that they are the remains of vascular plants, with some resemblance to the Lycopodiaceæ. Some of the fragments are from 4 to 5 inches wide, and the author had traced trunks some feet in length. He thought they had drifted to the position where they were now found. Leaf-markings generally are not preserved; but from the wrinklings still remaining on some specimens, he thought it probable they had been covered with leaves spirally arranged. Some fragments show scars arranged irregularly on the surface; probably these are fragments of roots. The plant seems to some extent to combine the characters of Stigmaria, Sigillaria, and Lepidodendron. Further details of the appearance of the specimens were given. For one which appears to differ from all hitherto described he proposes the name of *Berwynia Carruthersii*.

English Equivalents of Alpine Strata.—I should be obliged if any one would inform me of the English equivalents of the horizons treated of in Von Hauen, "Cephalopoden der Nordostl. Alpen." If the Lias—what zones or what relative beds?—*E. A. W.*

How to get Foraminifera from Chalk.—Noticing an inquiry on the part of a correspondent as to the best method of washing foraminifera from chalk, diatoms from clays, &c., I thought that a description of a process by means of which I have obtained some splendid washings from the chalk of this locality, might be welcome on account of its simplicity. The apparatus consisted of two ordinary medicine bottles and about 18 inches of small india-rubber tubing such as can be purchased at any chemist's. First procure a piece of soft chalk, the softer the better, and that which has been partially broken up by the action of the weather is better still. Scrape this with a knife to a fine powder, and put in one of the bottles which should not be more than about $\frac{1}{10}$ full; then fill up the bottle $\frac{3}{4}$ full of water and shake vigorously and repeatedly; allow this to stand for some time, and then draw off the milky fluid with the siphon—do this again and again until when shaken up the bottle appears as it were no longer full of a milky fluid, but, when placed close to the eye against a bright light, of small separate grains diffused in the water. These are the treasures we are in search of, but they have next to be separated from the larger fragments of chalk which have not been disintegrated by the scraping and shaking. To do this shake up the bottle, and with the siphon immediately draw over water and foraminifera into the second bottle; thus a certain portion of shells together with nearly all the water is drawn over, allow these to settle, then draw off the clear water and repeat the process until all or nearly all the shells are in the second bottle, leaving the lumps, &c., in the first, then filter on to blotting paper and dry in an oven when they will be ready for mounting. I reckon about one pill-box full of foraminifera to a washing and store them dry; to mount, boil in a test-tube with turpentine and mount in balsam. While my pen is in my hand I may as well mention that the preparation sold as Stephen's Silicon in shilling boxes for cleaning jewelry is really a perfectly clean diatomaceous deposit ready for immediate mounting. Could any of the readers of Science-Gossip tell me the names of the forms and the locality, as it makes a capital object? If your correspondent cares to communicate with me at the Grammar School, Maidstone, I shall be happy to forward him a small enclosure of washed chalk foraminifera.—*Frederick F. Grensted.*

A probable Marine Shell from Erith.—In a sample of lower brick-earth kindly sent me a few years ago by Mr. R. W. Cheadle, I discovered two small shells with the columella very much produced. These were recognised by Mr. G. B. Sowerby as "Fry of Fusus." Now this is somewhat curious, seeing that all the shells heretofore found in the brick-earth have been land or freshwater species, while the genus Fusus is truly marine and comparatively speaking a deep-sea one, the common *F. Islandicus* ranging from five to eighty fathoms. Any indication of marine life in the Thames Valley might be looked for in such shells as *Cardium edule*, or *Scorbicularia perforata*, but no such estuarine shells have yet been discovered at Erith or Grays, although the Cyrena, so abundant in the brick-earth, appears in some cases to have had its habitat so near to salt water, that freshets carried it into marine deposits, as its association with the marine Mollusca of the gravels of Kilsea Hill, Yorkshire, proves. After the appearance of a short notice I sent to the "Bayswater Chronicle," a gentleman well versed in post-tertiary shells, gave it as his decided opinion that the two shells were not Fusus at all, but probably apices of some other shell. Now in this opinion I cannot agree, as I have carefully compared them with figures and specimens of Fusus, and I find their apices are exactly like that of Fusus, and I also find that no other genus of shells that I am acquainted with has these apices. If not really of the brick-earth age (which their condition seems to denote) they may have been derived from Eocene beds, seeing that such shells mostly derived from Woolwich beds frequently occur in the brick-earth; but I think the matter requires further investigation.—*H. W. Kidd, Godalming.*

The Sea-Lily, Pentacrinus.—At a recent meeting of the Microscopical Society of Liverpool, a paper on this subject was read by the Rev. H. H. Higgins. He said the meridian of the sea-lilies, Pentacrini, seems to have been reached in the seas of the mountain limestone, where they covered thousands of square miles, and became constituents of sedimentary rocks many hundreds of feet in thickness. Their extreme beauty and complexity of structure, is attained by natural selection, points to a pedigree of immeasurable antiquity, concerning which nothing is known. The sea-lilies have been placed near the polypes, but the latter are radiate in type, the forme are annuloid: the latter have a good canal open to, or constituting, the body cavity; the former have a distinct good canal with oral and anal apertures: the latter have no neural regions; the former have a nervous system branching from a ring with pseudo-ganglia: the latter have thread-cells; the former are without thread-cells: the latter generally are composite; the former are always simple. The annuloid structure of the sea-lily has nothing whatever to do with the "ringed" appearance of the stem. The segments, which are five in number, are "ringed" in a horizontal plane, like the figures on the dial of a watch laid upon a table. This is true of all the Echinodermata. The star-fish is therefore not a rayed animal. From an example of a "mend" in a fragment from the plume of a sea-lily, the subject of the restoration of lost parts led to the following remarks. How a speck of "plasma" having from its position a special junction can take upon itself to change that junction, and charge itself with the duties attached to a fertilised ovum; at the same time having its embryological potency modified so as exactly to suit the special requirements of a situation determined by an accident, is an enquiry from the threshold of which he that assumes to be scientifically rich must be sent empty away.

The Director-General of the Geological Survey.—Professor Ramsay, the Director-General of the United Kingdom Geological Survey, has just received the honour of Knighthood. We understand that Sir Andrew Ramsay retired from the post of Director at the end of December, and Professor Geikie takes his place.

NOTES AND QUERIES.

Carbolic Acid and Snakes.—Notice was brought to me yesterday (I write from Calcutta) that a large snake had been seen on a piece of waste land which adjoins my house, and which lies between two walls that meet at an angle. A native servant refused to attack it, as it was of a very deadly species, and had got away into the corner where the walls meet, and where, owing to the jungle, &c., it would be difficult to get at, while it would have the advantage of its assailant, at whom it would have sprung with ease. I thereupon mounted one of the walls, a wall between ten and twelve feet high, and saw the snake with his head and about six inches of his body protruding from a hole close into the corner. As soon as he noticed me he turned to escape, and in doing so managed to expose the whole of his body. I called for a bottle of carbolic acid, and poured some on the snake, but not more than a tea-spoonful actually fell on him. He then glided rapidly into his hole, and I feared he was lost. In three or four minutes he emerged, moving very much more slowly than at first, and making his way out of the corner. I now called for a stick and some stones, and my attention was thus drawn off for a minute or two; when I looked again, I found that a second snake longer and considerably thicker than the first had entered an appearance. I succeeded in pouring quite a table-spoonful of carbolic on snake No. 2, which was making for the same hole. The instant the acid touched him he became perfectly confused. He tried to wriggle into the hole, but could not manage it, and turned to get out of the corner. He was evidently in pain. As he passed under me I dropped a brick-bat on his back, which disabled him. Snake No. 1 had meanwhile made his way through the weeds, for a distance of about fifteen feet from the corner where the carbolic was poured on him. He soon came to a dead halt. I noticed the weeds round him quivering, probably from some tremulous motion of his body, for he was otherwise perfectly stationary. My servant now ventured to jump on the triangular plot of ground, armed with a stick, and soon smashed the head of snake No. 2. I directed the man to the spot where snake No. 1 was, but the reptile was already stone dead; the carbolic acid alone seemed to have done for him, within ten minutes from the time it touched him. On a previous occasion I employed carbolic acid to disable a bad snake which had lodged himself at night in a small closet, and on a window frame where he could not be got at without some risk. The acid is a poison for both snakes and toads. Two or three drops placed on a large toad's back kill it in a few minutes. Persons residing in a snaky locality should always keep a supply of carbolic acid, the quality known as commercial, and used as a disinfectant, will be found most useful. I managed to get two very good micro slides from the blood of my victims yesterday, which I have mounted dry. They show the oval corpuscles splendidly. The snakes were between three and four feet in length, the longer of the two about three feet seven inches.—*W. J. Simmons.*

Tadpoles in October.—I have this week found some young tadpoles of the newt (I do not know which); is not this rather an unusual time of year for them? They were in a pond entirely shaded by trees, which the sun seldom or never sees.—*Wilson Noble.*

Larks and Toads.—Can any person inform me what is the meaning of Shakespeare's line, "Some say the loathèd toad and lark change eyes"?—*F. I. B.*

Cormorants.—An English farmer tells me he has shot cormorants on the banks of the river Teify, between Ystrad Meurig and Tregaron, and has seen them in the neighbourhood of Llyn Teify and Llyn Gynnow. The former locality is eleven and the latter sixteen miles in a direct line from the sea. There is no doubt they paid a visit to these waters for poaching purposes, as both river and lakes contain trout.—*E. Halse.*

Objects in Aquarium.—About a month ago, I got a glass jar, filled it with sea-water, and put in some weed, a few anemones, and a periwinkle or two. This morning, whilst I was aerating the water, I observed some very minute creatures darting about amongst the weed. On looking at them through a quarter-inch lens, I saw they were quite transparent, and had a black line right through the centre of their bodies, which, I suppose, is all the digestive system they possess. They also had, what seemed to me antennæ, at each end of them. On first looking at them, they appear very much like the common rat-tailed maggot, on a small scale. Can any of the readers of Science-Gossip tell me what they are, and oblige—*An Amateur Lady Naturalist.*

Hive and Humble Bees.—During ten years' experience of bee-keeping, I have noticed one circumstance that may be of interest to entomologists, viz. that the hive or its vicinity is a favourite resort for a great variety of insects. Generally my hives are sixteen inches in diameter, and covered with large bread-pans of the old-fashioned conical type, which are inverted and placed on the top of the hive. This pan does not fit quite closely round the edges, especially when I am supering on the top of the hive. Various insects select this spot for a habitation. Frequently in the spring of the year, have I discovered the queen hornet, commencing her nest on the underside of the pan, and at other times its removal reveals quite a museum of insects and their eggs. Then at this season of the year, when the resources of nature begin to fail and the chilling winds drive insects to winter quarters, queen wasps find their way to this strange hiding-place, and the quilt on the top of the hive is an additional attraction. Of course I take care to keep my stocks of bees strong and healthy, so that any insect intruders that may chance to pass the bee sentinels at the entrance of the hive may be overcome. Failing to effect an entrance, it is but natural that they should one and all take up their abode when possible on the top. Honey is a prize coveted by all insects, and failing to obtain a taste, they would fain be content with the aroma at the top of the hive. Warmth may furnish an additional attraction. One day this summer, upon examining a hive upon which I had placed a crate of one pound sectional supers covered with a quilt of wadding, I heard a tremendous hubbub, and a closer examination discovered a nest of humble bees. They were of a very small variety, and throughout the summer afforded a most interesting opportunity for observation. Upon the wadding being removed for the purpose of inspection, the noisy way in which they resented the interference was very remarkable, and in the course of a few hours the wadding was invariably replaced by the little creatures themselves, and as the colony grew the ball of wadding expanded. But the humble bees have entered upon their last sleep, and are now quite torpid, many have been overtaken by the autumnal cold, ere their cells were vacated. One can but admire the selection of so remarkable but suitable a home, by the little humble bees. They must have gained some help, from the warmth derived from the hive bees underneath them, while the wadding formed a good non-conductor of heat above and around. It is rather strange that the wasps did not attack them, or were they deterred by the noisy protest of the inmates of this conical heap of wadding? One autumnal day two field mice took possession of another corner of this same sheet of wadding, but without interfering with the bees. They were soon summarily ejected by me, and being very fat I wondered whether they were keeping the humble bees' nest in reserve as a dainty morsel for winter consumption, certainly they had not lain so close to the nest for several days without discovering it. I should be glad to know if any of the readers of your interesting magazine, who are beekeepers, have ever found a colony of humble bees in such close proximity to their educated and domesticated neighbours.—*J. A. Smith.*

FROG SPAWN.—In answer to the query of P. W. A. in the November number of SCIENCE-GOSSIP, I may say three causes would contribute to solve the mystery. (1) Water-snails often eat the jelly urrounding the young tadpole, thereby causing the death of the same; (2) they ought to have plenty of food, both vegetable and animal, or else they fall on their nearest relations, "and finish them right away;" (3) without a good light they will never come into frogs, but will gradually die off.—*A. Fieldsend.*

MILDNESS OF THE SEASON.—As I was taking a walk on Sunday, the 20th of November, along the road between Donnybrook and Blackrock, to the southern side of the city of Dublin, I noticed the following plants (twenty-six species) in blossom, a remarkable number I think for this time of year. *Ranunculus acris, R. repens, Stellaria media, Draba verna, Capsella bursa-pastoris, Sisymbrium officinale, Rubus discolor, R. cæsius, Geum urbanum, Geranium Robertianum, Veronica arvensis, V. polita, Bellis perennis, Leontodon taraxacum, Lapsana communis, Hypochæris radicata, Senecio jacobæa, S. vulgaris, Sonchus oleraceus, S. asper, Petasites fragrans, Achillea millefolia, Lamium purpureum, Euphorbia helioscopia, Rumex obtusifolius, Polygonum persicaria.* Most of these were in considerable profusion, but the herb robert certainly eclipsed every other flower, covering whole banks with its pretty pink blossom. Among the few that showed only a lingering knot of flowers, here and there were the two brambles, the avens, and the whitlow-grass.—*Charles B. Moffat.*

MILDNESS OF THE SEASON.—It may interest some of your readers to hear that a very fine bunch of *Viola odorata* was brought me on Thursday, December 1st, which had been picked by some ladies during a walk from Limpley-Stoke to Bath, a distance of about four miles. Primroses are also in fine bloom in the same locality.—*Charles F. W. T. Williams, Bath.*

THE MILD AUTUMN.—As I walked down the road to-day (November 12th) I saw a plant of *Jasminus nodiflorus* in full bloom; is it usual for those plants to be out so late in season as this? We have had very mild weather lately, so that may account for it. —*Alex. Wm. Ogilvy, Windsor.*

TURNSTONE.—There can be no doubt that the description by Edward of the habits of this bird is correct. Edward has been for many years well known to many naturalists, and without at any time being suspected of misrepresentation. It seems to me not very good taste for your correspondent to throw doubts on Edward's statements, because your correspondent in his small experience (as is proved by the fact that he thinks the bird web-footed) has never seen a similar act performed.—*Henry Laver, F.L.S., Colchester.*

QUERY AS TO A MOTH.—On referring to Newman's "British Moths," published 1869, under the heading *Cannæ* he says, "The moth has been taken in the fens of Cambridgeshire." I can find no mention of Neuricæ. Can your correspondent mean Myricæ? Of that moth he says, "Occurs plentifully at Rannoch, in Scotland, and has also been taken at Killarney, in Ireland, but hitherto not in England."—*R. E. Sidrake.*

BOTANY OF SPAIN.—Can any one inform me whether there is any book similar to Hooker's "Student's Flora") on the botany of the east coast of Spain, written either in English, French, Italian or Spanish?—*H. Hucklebridge.*

LATE APPEARANCE OF "HIRUNDO RUSTICA."—On November the 9th, I noticed a swallow flying strong on the wing for a considerable time over my garden and the buildings adjoining.—*W. Gregson, Baldersby, Thirsk.*

DO PARROTS REQUIRE WATER?—In a recent issue Mr. James Hooper stated that Mr. Bartlett, of the Zoological Gardens, says they do not require it. With all due deference to such authority, I think they do. I have a parrot thirty years old, and apparently as fresh as if four years old. I give it a drink of fresh milk in the morning, which it relishes.

I give it water twice daily, no baths. It has a peculiar cry when it sees anything it wants, or when it wants something not in sight. Sometimes I am at a loss to know what it wants, but frequently when such is the case, on offering water it drinks it with avidity.—*Philip Barker, The Grove, Nantwich.*

Preserving Flowers.—Will any of the readers of this paper tell me, what is the best liquor to preserve flowers and parts of flowers in, without the destroying of their colour and structure?—*En. Svensk.*

The Winter Nest of the Harvest Mouse.—Although spread over a great part of Europe as far as Western Asia, yet the harvest mouse (*Mus minutus*) is generally reputed a species of rare occurrence. But several circumstances may account for this. Its very diminutive size and the rapidity of its motions often cause it to be overlooked. That this little creature builds for itself a bird-like nest has long been known, and it is so singular a fact that it must attract curiosity; but it would now appear to have not only a summer nest, but to build, at least in certain localities, a winter nest, into which during the cold season it retreats. In a very charming article in a recent number of "Notes from the Leyden Museum," Professor H. Schlegel describes these winter nests as he found them in a locality near Leyden in 1868. This locality is situated at a distance of about two miles from Leyden, in the neighbourhood of the castle of Endegeest, celebrated as having served for a refuge to the philosopher Descartes after his exile from France. Here, on the right-hand side of the road leading to the village of Rynsburg, not less celebrated for its abbey than for being the residence of Spinoza, there is to be found a ditch some quarter of a mile in length and six paces in width. Part of the border of this ditch was grown over with reeds. Close observation soon showed that these reeds actually contained about fifty nests of this little mouse. During the breeding season these were of the usual globular form, of the average size of a man's fist, and showing near the top a little circular opening for the entrance of the little animal. But the winter nests were quite different. These were composed of various mosses, and were attached to and between several stems of reeds, exactly like the nests of the reed warblers, but more fusiform, of from six inches to a foot in diameter. They showed no inlet, and were placed at the height of a foot over the water's level. The animal when entering had to remove the upper part of the covering, which was less densely interwoven, and was concealed between the moss. It would seem evident that the building of these nests was a just calculation of being safe against the danger of drowning.

Weasel or Stoat?—My attention has been directed to S. A. Brenan's note at page 166, in which he says—"W. Thompson in his 'Nat. Hist. of Ireland,' writes that it has been found at Torhead." Your readers can judge of the value of S. A. Brenan's "own observation that the weasel is to be found in the North of Ireland," when they have the *ipsissima verba* of our Belfast naturalist before them, vol. iv. page 6. "The Weasel, &c.—I have never met with this animal in Ireland, nor do I consider that the species has yet been satisfactorily proved to be native, although it may be so. The stoat which passes under the name of *weasel* in this country is common thoughout the island: and from the circumstance of Templeton having noted the weasel as 'common,' and the stoat as 'rare,' I am led to believe that by weasel he meant stoat. Macgillivray tells us ('Brit. Quad.' page 164), that the weasel 'is generally distributed in Ireland,' but no authority is given. Mr. J. V. Stewart notes both the weasel and stoat as occurring in co. Donegal; and two skins of the true weasel were given to me in 1842, which were said to have been obtained at Tor Head (co. Antrim)." The italics are Mr. Thompson's, who evidently intended to convey that he doubted their Hibernian origin. Mr. Thompson's accuracy is too sacred to allow such a misquotation as above to remain uncorrected. The matter can be settled by S. A. B. in his own favour by his producing some of his Ulster acquaintances, the Irish weasels.—*A Member of the Belfast Naturalists' Field Club.*

Hare-bell *v.* Hair-bell.—Perhaps you are growing weary of this subject, unless you agree with me that it is only by arguments such as these that we are able to come to any proper conclusion in such matters. Although, from the hair-like stalk of *Campanula rotundifolia* it may seem better to call it hair-bell, its most ancient name appears to be hare-bell, from its being found on heaths and in thickets most frequented by hares. Bailey, in his Dictionary, 1776, does not mention the flower under any name: but Walker, in his Dictionary, 1857, speaks of hare-bell, as being a blue of a bell-shape; and he also speaks of hair-bell as being the hyacinth. Indeed there appear some good grounds for such a name; for Dioscorides, a Greek physician of the time of Nero, tells us that the root of this flower will procure hair on bald and beardless men. From this we may gather that *Campanula rotundifolia* is the hare-bell of the poets; and that *Hyacinthus non-scriptus* is the Hair-bell of modern writers.—*A. W. Peachey, Tewkesbury, Gloucester.*

Hair-Bell, Hare-Bell and Air-Bell.—Surely the wild hyacinth is the hair-bell said to derive its name from the tremulous motion of its flowers, which indicate, so some writers opine, the breathing of the hare. The hair-bell was, I always thought, identical with the air-bell of the poets, the *Campanula rotundifolia*, whose stamen stem resembles the moss hair, and whose elastic stem also waves with even the slightest breeze. Scott calls this flower the hare-bell, but the succulent stem of the true *Hyacinthus non-scriptus* would, if trodden upon, be too crushed to rise again, as the poet describes his hair-bell to have done when "Ellen's" fairy step bent them; therefore one can but conclude Scott mistaken and botanists right, when they say that the hare-bell is the wild hyacinth, and the hair-bell or air-bell the *Campanula rotundifolia.*—*Helen E. Watney.*

The Regime of a Fowl House.—From a window of my lodgings I can see a fowl-house, inhabited by about a score of fowls. During the summer there was order in this house, the order being maintained by the cock. Once, and once only, I saw two hens fighting, but after a few minutes the cock managed to pacify them, by a mixture of caresses and pecks. I may add, that this fight arose because one hen would not budge for another that had chickens. Recently the cock has been removed, and the hens left without a master. The consequence is, that now the hens are engaged in either real or sham fights all the day long. Sometimes the whole lot of them will start careering about their house, indulging in a species of tournament, which generally terminates in a pitched battle. Thus the order of the community seems to depend on the cock entirely. —*W. H. Bansall, B.A. Cantab.*

DREISSENA POLYMORPHA.—Whilst paddling up the Thames in search of microscopic material I came to a low weir whose well water-worn and green and brown timbers seemed to promise good hunting ground. On looking down into the water I saw attached to the stones and in the interstices of the wood-work masses of shells attached by their byssi that looked exactly like the common marine mussel (*Mytilus edulis*). A close examination and dissection however proved it to be *Dreissena polymorpha*, a native of the Black Sea, the Danube and the rivers of Russia. In Turton's "British Shells" it is mentioned as occurring in the Commercial Docks, the Union Canal and the river Nen in Scotland where it has been probably introduced, adhering to Baltic timber, and it is highly probable that it was introduced by the same means into the locality where I found it, *i.e.*, on the timber used in constructing the weir. It is at once distinguished from the common Thames swan mussel (*Anodon cygneus*) by its shape and byssus, and from the marine mussel by its mantle being continuous, except just where the two siphons protrude, and by the shell possessing a septum. It is said to be capable of living out of the water for several weeks, and although I have not tried the experiment I have some in a glass jar filled with water that seems none the worse for the confined space and absence of the running water that I found them in. The shell is a dark brownish-olive, equivalve, deeply keeled and inequilateral. The beaks very acute, and bent down a little, they almost touch, and are furnished internally with a septum. The interior is milky-white, indistinctly iridescent. The animal has the mantle closed all round, except small openings for the foot and the two siphons. The mantle is of a creamy-white colour, and towards the wider basal portion it becomes of an orange colour bordered with two blackish or deep purple borders. The foot is pale yellow, with a tuft of byssus at the base and a distinct byssal groove. I shall be very pleased to point out the locality where they occur, or to forward specimens to any one interested in British freshwater conchology.—*E. Gardner, Shepperton.*

LATE SWALLOWS.—Horace Pearse, F.L.S., Stourbridge, says he saw a swallow on the 5th of November. I have in print a statement that I saw a chimney swallow on November 13th, 1875, about noon, flying before my windows in my garden; about two hours afterwards I saw one, but whether it was the same I do not know. Swifts, chimney swallows, swallows or house martins, and the sand martin. The Swift comes late and goes early. Swallows, the woodcock, snipe, cuckoo, nightingale, wryneck, and many others. The locality has much to do with their appearance, for the place where they leave the coast must be the last place where they are seen, and the place on their return where they first reach land must be the first before they disperse themselves over the country.—*Thomas Kingsford, Canterbury.*

AN INTERNATIONAL ASSOCIATION FOR THE OBSERVATION OF HAILSTORMS.—Mr. J. A. Westwood Oliver has notified to us his intention of endeavouring to organise an International Association for the observation of Hailstorms, and wishes any of our readers who are interested in Meteorology, to communicate with him at the London Institution, Finsbury-circus, E.C. Mr. Westwood Oliver states that no other instruments than an ordinary barometer and thermometer are needed.

CORRECTION.—Through an oversight, fig. 141, p. 244 (last vol.), represents a rhombic, instead of a pentagonal dodecahedron.—*E. H.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

A. W. PRESTON.—We do not undertake to return specimens sent us to be named.

"MUCROSS."—The specimens are fungi, the yellow one being *Tremella mesenterica*, and the white *Tremella albida*.

T. B.—Get the "Pocket Guide to British Ferns," by M. S. Ridley, price 2*s.* 6*d.*, published by D. Bogue. It will give you just the information you seek.

P. BARKER.—A general index of the first 12 vols. of SCIENCE-GOSSIP was published at the end of 1876, price 1*s.* 6*d.*, and may be had of our publisher.

GRANTLEY.—Your clams are a species of *Cytherea*, not found in British seas; but there is no reason in the world why they should not be acclimatised as food animals in our waters.

J. B. M.—The "Aquarium" gives a list and description of fresh-water animals suited to an aquarium. Spence Bate's work on the sessile-eyed crustacea includes those you mention, but it is rather expensive.

J. B. J.—Rimmer's "Land and Freshwater Shells" is by far the best for your purpose, as it contains a photograph of every species. Price 10*s.* 6*d.*, published by D. Bogue, 3 St. Martin's Place, Trafalgar Square, W.C.

ELLIOT.—The bones of Ichthyosaurus and Plesiosaurus are very frequently found in the boulder clays of Norfolk and Suffolk. They have been deposited there from the wreck of the oolitic rocks.

J. T. HILLIER.—Your specimen is the bird's nest (Nidularia), and the shell a species of Pisidium.

R. B.—Professor Greene's "Physical Geology" is by far the best we know for bringing up all matters to the most recent date.

T. L.—Any of the microscope makers advertising in our columns will answer your query more satisfactorily than we can.

J. W. O.—It is very difficult to safely name the species of corals from such small fragments as those sent, as much depends upon the manner of branching. But we have little doubt as to the genera, which are as follows: 1, Fungia, 2, Creusia, 3, Pocillipora, 4 & 5, Stylaster. All are concerned in reef-building, but especially the last four, which are now classed as Hydrozoan corals.

F. H. S.—We are not aware that the common centipede when crushed gives out a phosphorescent light, but the common millipede (*Geophilus electricus*) constantly leaves a phosphorescent trail. The insect you enclosed is the common cricket (*Acheta domestica*).

F. H. HELE.—We have never seen or heard of scarlet fluorspar; Saxony and Alston Moor produce rose-coloured cubes, and nearly orange-coloured crystals are obtainable in Derbyshire, the colour being due to iron oxide.

J. W. W.—You will find in "Notes on Collecting and Preserving Natural History Specimens," published in 1875, price 3*s.* 6*d.*, edited by the Editor of SCIENCE-GOSSIP, that all the subjects you mention have already been treated upon, from geology to entomology, and that each subject was written upon by well-known writers in each department.

V. G.—Your tree (as indicated by the fruit sent) is the Wild Service Tree (*Pyrus torminalis*).

T. B. W.—The plants are, 1, *Anemone sulphurea*, and 2, *Biscutella lævigata* (Cruciferæ).

EXCHANGES.

SIDE-BLOWN eggs of golden-winged woodpecker offered; desiderata, eggs (side-blown), merlin, hobby, wood-sandpiper, Brummich's guillemot, bridled guillemot, gull-billed tern, white-winged black tern, great black-backed gull, &c. Offers solicited.—W. Wells Bladen, Stone, Staffordshire.

"RAPIN OF GARDENS," a Latin poem, English'd by M. Gardiner, in exchange for British birds' eggs; sea birds especially. Offers solicited.—W. Wells Bladen, Stone, Staffordsh.

FOR well-mounted slide of scale of Dee salmon, splendid polar object, send other good slide; desideratum, Polycystina.—John R. Marten, Cottage Hospital, Redhill.

DUPLICATES (Lepidoptera), *V. Io, C. Phlæas, L. Megæra, H. Semele, C. Cardui, M. Artemis;* desiderata. *V. Atalanta,* any of the Sheela genus, or what offers?—W. E. Watkins, 32 Huntingdon Street, Barnsbury, London, N.

CANADIAN plants, insects, shells, bird-skins, skins of mammals, &c., in exchange for English species.—W. G. A. Birdie, 325 Parliament Street, Toronto.

FOR slides, starch from Calabar bean (polar), and parasite of pig (*Hæmatopinus Suis*), send other slides or material.—Linden, New Brompton, Kent.

ABOUT 140 British birds' eggs, including guillemot, lesser black-backed gull, lapwing, carrion crow, jackdaw, magpie, pheasant, partridge, moorhen, stockdove, and many others, in exchange for good telescope, microscope, or opera glass.—Henry Porter, Goxhill, Lincolnshire.

OFFERED, about 400 fossils, chiefly carboniferous. Wanted, a good second-hand microscope.—J. A. H., 70 Helena Street, Burnley, Lancashire.

A FEW duplicate slides of Holothurian (plates and skin), *Grantia compressa, Halichondria incrustans, Desmacidon ægagropila,* &c. Wanted, British marine shells, or mounted molluscan palates.—Dr. Keegan, Holywood, near Belfast.

WANTED, L. C., 7th ed., 349, 377, 388, 580, 613, 1035, and others. Can offer good specimens of 273b, 317, 556, 557, 594, 1635, and many others, in exchange. Send lists.—A. W. Preston, St. Philip's Road, Norwich.

WANTED, old prints, engravings (small), sketches or early MSS.; will give wrought flints.—G. Clinch, Rowe's Farm, Hayes, Kent.

LARGE aquarium, 2 × 2 × 4 ft., slate ends and bed; plate glass, on polished oak stand. Holds about 100 gallons. Suitable for public institution or naturalist, cost about £14. Exchange scientific or standard books, treadle lathe or offers.—H. H., 8 St. Mark's Road, Wolverhampton.

FOR exchange, a limited number of slides of parasite of fly (*Hypopus muscarum*), also other parasites. Communicate before sending any slides.—W. A. Hyslop, 22 Palmerston Place, Edinburgh.

WANTED, two hawkweeds, *H. calenduliflorum* and *flocculosum.* Offered, the choice of many and great rarities, British and foreign.—R. Wood, Westward, Wigton.

WANTED, in exchange for other works, SCIENCE-GOSSIP, Nos. 175–189 inclusive.—W. Macmillan, Castle Cary, Somerset.

ANATOMICAL and pathological slides, material or sections; entozoa and ectozoa, diatoms: for parasites and other slides or material of interest.—F. L. Carter, 20 Trafalgar Street, Newcastle-on-Tyne.

A POLISHED pine cabinet, six drawers, graduating in depth with 110 divisions, suitable for shells, birds' eggs, stones, &c.; will exchange for small microscopic-cabinet, or well-mounted slides, books, or apparatus. Also about eighty eggs, some rare, with or without the above; a list of the eggs sent on application.—H. R. S., 10 Avenue Road, Regent's Park, London.

PUPÆ of Furcula, Vinula, Dictæa, Ziczac, Quercus, and fine series of *S. populi.* Wanted, birds' eggs or other objects.—R. McAldowie, 4 Brook Street, Stoke-on-Trent.

TWO vols. of "Chronicles of Eri," by O'Connor, pub. 1822; "Gravitation," 1 vol., by G. B. Airy, 1834; "Travels of Modeen," 1 vol., by J. E. Alexander, 1827; all in good condition. Will exchange for works on management of the microscope, and a fair collection of mounted microscopical slides, or what offers?—W. J. Hooper, Hermine Cottage, East St, Chatham.

I HAVE four years of SCIENCE-GOSSIP complete, unbound—1878, 1879, 1880, 1881—for exchange.—H. C. Ransome, Stoke Hall, Ipswich.

MIOCENE FORAMINIFERA (named), large species, and mounted sections of spongilla, &c., offered for foraminifera, polycystines, diatoms, &c. (mounted or material).—Dr. Rudolf Haeusler, Dedham, Essex.

A PACKET of twelve unmounted micro objects sent in exchange for a well-mounted slide.—Fairmount, 153 Breakspears Road, Brockley, S.E.

MILLER'S "Chemistry," 2 vols., published at 40s., nearly new; SCIENCE-GOSSIP 1877, 1879, 1880, unsoiled, uniformly bound; Tyndall's "Fragments" in one vol.—W. Jacobs, 41 Macfarlane Road, Shepherd's Bush, W.

UNMOUNTED material (echinus, &c.), offered for anatomical slides.—B., 9 Royal Terrace, W. Kingstown.

WANTED, "Popular Science Review" for 1881.—Dr. Cunynghame, 6 Walker Street, Edinburgh.

WANTED to exchange, a 50-in. bicycle, Singers' "Challenge," for a microscope or works and objects on natural history.—S. B. Axford, 15 Commercial Road, Bournemouth.

WANTED, last edition of "Hogg on the Microscope," also good slides. Can offer several varieties gorgonias, spicules, starches, hairs, &c.—J. E. Fawcett, Rawdon, near Leeds.

WHAT exchange for fine copy of Prichard's "Man," 2 vols., 62 coloured plates, 1855?—B., 9 Royal Terrace, W. Kingstown.

LON. CAT., Nos. 275, 315, 394, 626, 653, 667, 657, 843, 862, 1271, 1276, also Rubi and Rosæ varieties and others, in exchange for rare or local British plants. Lists to J. R. Neve, Chipping Campden, Gloucestershire.

WILL exchange several good mounted slides of hairs, Indian bat, spicules, photographs, &c., for others, physiological injected ones preferred.—S., 3 Cobden Place, Leeds.

WILL exchange good case of dissecting instruments, also a surgical instrument case, for Cole's series of physiological injection slides.—S., 3 Cobden Place, Leeds.

FOR exchange, 10-in. plate electrical machine, with various apparatus for experiments, &c.; wanted, micro-slides and material, air-pump, or offers.—T. E. Jobling, Coxledge Colliery, Newcastle-on-Tyne.

WHAT offers for 1858, 1859, 1860, of "The Proceedings of the Scientific Meetings of the Zoological Society of London," with illustrations, unsoiled and unbound? Also 42 numbers of "The Genera of Recent and Fossil Shells," by G. B. Sowerby, with original plates (coloured), unsoiled and unbound.—John Boggust, jun., Alton, Hants.

WANTED, a case of minerals and fossils to illustrate Lyell's "Manual;" will exchange a large unmounted albatross, Cassells' "History of England" (calf): Bain's "Education;" physiological slides.—W. N., 37 Flaxman Street, Liverpool.

GOOD plants of *Asplenium lanceolatum* and *Gymnogramme leptophylla* offered for well-dried fronds of *Ceterach officinalis* and *O. regalis,* or plants of the former.—J. Sinel, Bagot, Jersey.

DUPLICATES, *Ophrys apifera, Potentilla fruticosa, Malaxis paludosa, Goodyera repens, Alchemilla alpina.* Shells, *Cypræa asellus, C. helvola, Neritina viridis, Strigila carnaria, Oliva luteola, Columbella mercatoria, Tellina radiata, Aporhais pes-pelicanus, Bulimus acutus.*—Rev. J. M. Hick, Staindrop, Darlington.

WANTED, *Purpura lapillus,* freshly-killed animal as well as shell. Dried specimens of *Acorus Calamus, Nigelia sativa, Lolium temulentum,* exchange.—Tunley, Albert Road, Southsea.

SWISS, Pyrenean, and Mediterranean plants (including grasses, carices, &c.). A magnificent collection of the above for sale at 6*d*. each, all named and dried. The Swiss flora is especially complete.—Dr. B., care of Editor, 3 St. Martin's Place, Trafalgar Square, London, W.C.

BOOKS, ETC., RECEIVED.

"The Microscope." By G. Davies. London: D. Bogue.

"Life, Letters, and Journals of Sir Charles Lyell, Bart." 2 vols. London: John Murray.

"Easy Star Lessons." By R. A. Proctor. London: Chatto & Windus.

"Leaves from a Naturalist's Note-Book." By Andrew Wilson, F.R.S.E. London: Chatto & Windus.

"Practical Chemistry." By J. Howard. London: W. Collins, Sons, & Co.

"The Home Journal."
"Journal of Applied Science."
"Union Jack Naturalist."
"The Antiquary."
"Midland Naturalist."
"Northern Microscopist."
"Land and Water."
"Ben Brierley's Journal."
"Natural History Notes."
"American Naturalist."
"Canadian Entomologist."
"Good Health."
"Cosmos, les Mondes."
"Science pour Tous."
"Le Monde de la Science."
"Les Feuilles de Jeunes Naturalistes."
&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 9TH ULT. FROM:—G. M.—J. A. H.—W. E. W.—H. W.—E. T. S.—M. H. B.—H. B. L.—E. L.—W. W. B.—E. H.—J. R. M.—A. M. McA.—J. S.—R. S.—Dr. K.—R. McA.—C. F. W. T. W.—A. R. S.—W. A. G.—A. M.—X. F.—W. M.—R. W.—J. R.—C. V. R.—G. F. W.—F. F.—F. L. C.—J. C.—G. D.—W. J. H.—G.—W. A. H.—A. W. P.—H. H.—G. S. G.—J. A. W. O.—T. W.—J. E. J.—P. J. S.—J. R. N.—P. M. C. K.—F. N. H.—F. H. S.—W. N.—W. H. T.—A. W.—A. M. C.—J. S.—T. E. J.—W. J.—S. B. A.—D. B.—G. T.—M. E. P.—J. B. M.—J. B., jun.—J. R.—W. T. G.—J. M. H.—H. P.—J. M. F.—W. E. D.—E. H.—W. G.—P. B.—J. H.—P. B.—A. B.—C. E. K.—T. B.—F. F. G.—C. C. A.—J. F.—A. L.—C. B. M.—H. B.—C. C. A.—W. S. A. B.—S. S. H.—O. W. J.—&c.

EARLY HISTORY OF THE DIATOMACEÆ.

By F. KITTON, Hon. F.R.M.S.

[*Continued from page* 9.]

LIGHT has great influence on various species of *Navicula* and *Frustulia*, and when they are kept in cylindrical glass jars they always attach themselves to the side nearest the light, leaving that which is dark. I therefore always search on the light-side for the finest specimens: kept in porcelain vessels filled with water, and exposed to the light, they rise to the surface of the water. *Surirella Venus* (fig. 8) generally keeps its cuirass *a a* closed during the day, when the opening is only seen in dead individuals; during the night and by very feeble lamp-light I have found many open, but they quickly closed when exposed to a more intense illumination.

Organs of Nutrition.—Nutrition and the organs necessary for that purpose, are extremely difficult to detect; we cannot adopt the means that enabled Ehrenberg to examine the true infusoria, seeing that the animalcules with which we are now occupied are unable to admit colouring substances. It is therefore only analogy that can assist us (and that very feebly) in these researches.

In the Surirellas and Naviculas I have never been able to detect the parallel tube in the body. In *Surirella Venus* (fig. 8) we can easily perceive a skin separated from one of the points of the mantle; this skin shows a slit *a* which leads to the contents *e*; by means of this slit the animal can eject the whole of them, but I have never been able to detect any aperture or cleft in the mantle.

The Naviculas, according to my arrangement, include the species of the older genera of *Frustulia* and *Navicula* in which we find on the pedal surface two apertures at the axes of the body, leading to two empty tubes which traverse the entire length of the animalcule, and which terminate at the two openings close to the smooth pedal surface.

The genus *Pharyngoglossa* is the only one of the series in which may be distinctly seen the mouth, the alimentary canal, and its anal aperture. The head is easily recognised by the fissure in the cuirass, from which the superior foot is extended; below this foot is an orifice in which may be seen a plug which it protrudes, this plug forms a part of the cylindrical bowel, which becomes very delicate as it approaches the posterior part of the body, and terminates at the orifice in the cuirass, and through which the hinder foot is extended.

Pharyngoglossa is also the only form of this class in which I have seen the ingestion of solid matter, which, when the plug is extended, rushes into the empty space (fig. 4) between what we, from analogy, have called the mouth and stopper. In speaking of the intestines, we alluded to the coloured substance in the animalcules, enclosed in the mantle; this is somewhat peculiar in its constitution and colour. In general this matter appears to be gelatinous, semi-liquid, homogeneous, containing drops of oil or fat, and very minute granules of solid matter. In *Surirella Venus* it forms a green or brown granular mass in the centre of the animalcule; in Naviculas, Frustulias, and in some Diatoms, this mass is spread out into a thin layer, coloured and curved at the margin towards the base, and which after the death of the animalcule becomes irregular.

The genus *Scalptrum* and some species of *Navicula* (undescribed) have the power of expelling the coloured contents through the opening we see on the ventral surface, they also appear to possess the power of reproducing these contents.

In the Diatoms and Fragilarias, we also detect this internal material excepting at the extremities of the body which are in consequence transparent. In the articulations of *Diatoma fenestratum*, it is composed of very pale globules of various sizes and isolated.

Organs of Propagation.—The organs of generation in these forms are very obscure, and their existence highly problematical. I have never seen them. I have made some observations (and which I have published), which are perhaps not without importance, but since then I have not been able to identify these organs with positive certainty.

The Naviculas and Frustulias attach themselves to each other by the pedal surfaces, and frequently remain in that position for several days before separating. I have seen a couple of Naviculas (*agrestis*) (fig. 9) also connected, but at a slight distance apart; yet in spite of this apparent separation they were united by two very narrow tubes *c d*, and I have moreover seen that these tubes pass through the openings in the cuirass into the coloured contents; I have also seen at the orifices of tubes areolæ (*aréoles*) produced by the contents being thicker and darker. They remained united about an hour, after which separation took place in the following manner, the tube *c* was withdrawn into the animalcule *e* and the tube *d* into the animalcule *f*.

I was also able to see on the pedal surface (fig. 9) two apertures, *d*, *c*, one large and the other minute. After the withdrawal of the tubes, the two animalcules separated. In a side view (fig. 9), I saw, although somewhat indistinctly, the two openings, *d*, *c*. In Pharyngoglossa, below the mouth and below the median line and alimentary canal, a little excrescence (fig. 4, *d d*) round and perforated in the centre may be seen; what its function is is very doubtful. I saw it, and mention it here. The propagation of the Oscillarias and Diatoms may possibly be effected by a separation of their parts. I have, however, never seen in these animalcules propagation take place by division, but it has been described by many naturalists, who have seen it in a higher order of infusoria; it has been admirably described by Ehrenberg.

All that they saw and called division of individuals, was that the animals formed part of a series or that they were a chain of animals. I have never seen new individuals growing on the animalcules separated from the chain, nor have I ever seen any reduplication, and consequently resulting in propagation by division, either longitudinal or transverse; neither have I seen the animal continue to live or regain its individuality and produce new individuals of its species.

(In connection with self-division he describes an experiment he made on a filament of an *Oscillaria* and which I give in his own words.)

"Les *Oscillariées* se décomposent bien dans la partie déjà morte; mais jamais un animalcule nouveau ne provient des morceaux séparés de cette partie. En coupant les fils des *Oscillariées*, j'ai vu celui auquel étoit attachée la partie de la tête ramper, croître et continuer à vivre, tandis que la partie inférieure coupée ne formoit plus de nouvelle, mourut, se décoloroit et se décomposoit."

The following is a list of the forms described by Corda, with their synonymy:—

Surirella Venus = *S. striatula*, Ehr.

Navicula costata = *Epithemia Westermannia?*

Frustulia appendiculata, perhaps an *Amphora*.

Frustulia agrestis, Rabenhorst refers to *Pinnularia viridis*, but it is not that form, it is more like *P. borealis*.

Frustulia viridescens.

Pharyngoglossa sigmoidea = *Pleurosigma sp.*

Diatoma fenestratum = *Tabellaria fenestrata* (fig. 10).

Diatoma Navicula = ? *Fragillaria capucina* or *Odontidium mutabile*.

Fragilaria undulata = ? *F. construens*.

Syrinx annulatum = ? *Rhabdonema arcuatum* (fig. 11).

Meridion cordatum = *M. circulare*.

Echinella crenulata = *Gomphonema minutissimum*.

Scalptrum striatum = *Pleurosigma attenuatum*.

SCIENCE IN THE PROVINCES.

WE have received the report of the proceedings of the Waterford Literary and Scientific Association, containing the abstracts of lectures and papers delivered before the Society. Amongst these are the following:—The opening lecture, delivered by the President, J. N. White, Esq., M.R.I.A., on "Volcanoes and Earthquakes." It is accompanied by a map showing the distribution of volcanoes throughout the world. A popular sanitary lecture on "The Outer Man," by H. Colpoys Tweedy, Esq., M.D. Dublin; in effect, a lecture on the skin, and clothing and ablution in connection with it. On the "Beginnings of Life." A lecture by Ringrose Atkins, Esq., M.A., M.D. This is accompanied by a plate showing various microscopical forms of animal and vegetable life. On "Frictional Electricity," by James Dowling, Esq. "The Records of the Caves," by R. J. Ussher, Esq. Mr. Ussher deals largely with the well-known Kent's Cavern in the neighbourhood of Torquay, and the caves of Dordogne, in the South of France. On "Gold," by Alderman St. George Freeman, J.P. The lecture is divided into four sections, as follows:—1. Gold in the mine; 2. Gold in the workshop; 3. Gold in the mint; 4. Gold in the pocket. This is a most readable and instructive lecture. "The Geology of Waterford and its Vicinity," by James Budd, Esq. On "Some Connections between the Animal and Vegetable Kingdoms, with special reference to Flowers and Insects."

The Transactions of the Eastbourne Natural History Society for November is to hand, and contains the Annual Address of the President (Dr. S. W.

Royston-Piggott, M.A., F.R.S.). In this is briefly summarised the work done by the Society during the past year. The subjects dealt with are numerous and very various, and they do great credit to the members.

The October and December issues of the Transactions of the Hertfordshire Natural History Society and Field Club contain the following contributions:—"The Formation and Arrangement of Provincial Museums," by John Hopkinson, F.L.S., F.G.S. Mr. Hopkinson divides museums into three classes, National, Provincial, and Educational, and shows the functions of each, he also exhaustively treats of the method of arranging museums. "Local Museums," by H. George Fordham, F.G.S. The paper treats of the functions and uses of local museums. Two contributions on local meteorological observations: the first is a "Report on the Rainfall in Hertfordshire in 1880," and one on "The Frost of January 1881, as experienced in Hertfordshire." They are both by Rev. C. W. Harvey, M.A., F.M.S. The first paper of the December part of the Transactions is by the same gentleman, and gives a series of meteorological observations taken at Throcking, Herts, during 1880. "Notes on Birds observed during the Year 1880 and the first three months of 1881." By John E. Littleboy, Esq. Mr. Littleboy records eight species new to the society's register. "Meteorological Observations taken at Wansford House, Watford, during the year 1881," by John Hopkinson, F.L.S., F.M.S. "Report on Phenological Observations in Hertfordshire in 1880," by John Hopkinson. "On the Presence of Cilia on the Tadpole of the Common Frog," by R. B. Croft, R.N., F.L.S., F.R.M.S. This is merely a short notice of the discovery of cilia on the exterior cuticle of the tadpole of the common frog (*Rana temporis*).

The Bristol Natural History Society have recently issued part iii. of vol. iii. of their "Proceedings," containing papers as follows:—"On the Breathing Apparatus of Aquatic larvæ," by W. J. Fuller. "On the Preparation of a Local Flora," by J. W. White. "Darwinism," by C. Jecks. "The Boulders of the Bromsgrove District," by O. Giles. "Catalogue of the Lepidoptera of the Bristol District," by A. E. Hudd. "Fungi of the Bristol District," by Cedric Buckwall. "A Naturalist's Ramble in Guernsey," by Adolph Leipner (Hon. Sec.), &c.

The Fifth Report of the Winchester College Natural History Society shows a very flourishing state of things. Among the papers published are the following:—"The Food of Plants," by H. T. F. King. "Glaciers," by A. H. Kensington. "The Sea Shore," by G. L. Hawkes. "Hemiptera," by W. A. Forbes. "Teeth," by F. A. Bather. "Botanical Report," giving lists of local plants. "Entomological ditto." "Geological Lists" of local fossils. "Zoological Lists" of local animals. "Lists of Land and Fresh-water Shells," &c. All the papers show a remarkable grasp of the questions discussed therein.

Whitby Naturalists' Field Club.—The annual meeting of this society was held a few weeks ago, when the following officers were elected to serve during the coming year: T. Newbitt, President; W. H. Tate, Chairman; A. Mallinder, Treasurer; W. H. Dotchon, Secretary; Committee: T. P. Dotchon, G. G. Skelton, and H. B. Thornton. During the year seventeen papers have been read, the principal of which were "Life on the Globe," and "Chemistry of Water," by the President, and "Observation," delivered by the Rev. J. C. Atkinson, M.A., at the inauguration of the exhibition, held by the club during the months of October and November.

The "Transactions of the Epping Forest and County of Essex Naturalists' Field Club," Vol. II. part 5; contain the following: "On the formation of Local Museums," being the conclusion of Mr. Harting's suggestive paper on this subject. "Infusoria: what are they? Their Collection and Investigation," by W. Saville Kent, F.L.S., &c. "Report on the Excavation of the earthwork known as Ambresbury Banks, Epping Forest," by Major-General Pitt-Rivers; "On the Origin and Distribution of the British Flora," by Professor Boulger. In addition to the above there is a full report of Proceedings, &c. The great success of this club, and the capital way in which the Transactions are brought out, reflect the highest credit on the Hon. Sec., Mr. Cole.

THE KANGAROO.

By W. T. Greene, M.A., M.D., &c.

[*Continued from page* 6.]

The wallaby (*Petrogale*) is distinguished from the kangaroos by a muzzle devoid of hair. The rock wallaby is one of the most remarkable animals belonging to this genus, and may be called the chamois of the family, inhabiting, as it does, wild rocky mountains, whose sides it seldom descends, even partially, whilst it is never met with at their base. The rock wallaby is a rather dangerous animal, owing to a habit it has when closely pursued of rushing against its enemy, and forcing him over the rocks; it is smaller than the red kangaroo, and is chiefly to be seen in the south-eastern parts of Australia; it is gregarious in its habits, but the herds, or mobs, are usually small.

The short-eared rock wallaby (*P. brachyotis*) is another shy and retiring animal, inhabiting the most inaccessible haunts. It is much smaller than the preceding species, and lives in caves and crevices among the rocks on the north-west coast. The tail is bushy, the terminal third being of a dusky-black colour.

The brush-tailed wallaby (*P. penicillata*) has a long harsh fur of a dusky brown colour, tinged with purple, and a greyish-white mark extending from the lip to the ear. The two sexes are of equal size. This species is nocturnal in its habits, and, like the two preceding, frequents rocky mountains; it is wild and shy, and readily ascends sloping trees, so that by persons unaccustomed to its appearance it has, more than once, been mistaken for a monkey.

Fig. 18.—The Kangaroo Rat (*Hypsiprymnus minor*).

The *Halmaturi* are distinguished from the two preceding genera, by having the muzzle rather elongated, and the tail shorter than the body, and covered with scales towards the tip. The black wallaby (*Halmaturus ualabatus*), the latter word being a Latinised form of the native appellation Wallaby, or Wallabee, is an animal of about four feet in length, with a long harsh fur which is blackish-brown in colour, turning to yellow on the under surface of the body; it is pretty generally diffused throughout the thick brushwood of New South Wales, and is very abundant in the islands at the mouth of the Hunter river. It is distinguished from all the other kangaroos by a jet-black spot under each arm.

Fig. 19.—Ursine Opossum (*Dasyurus ursinus*).

Parry's wallaby is a fine animal of a silvery-grey colour, which turns into purplish-brown upon the back; it is rendered especially conspicuous by a band of pure white extending from the tip of the muzzle, along the cheek, to the angle of the eye. The length of this species is five feet five or six inches; it is confined to a range of hills extending parallel with the coast from Port Stephens to Moreton Bay.

The Paddymellon, or Pademelon wallaby, is perhaps the most widely diffused, and the best known of all the kangaroos; it was first brought to Europe by some French navigators, who bestowed upon it the inappropriate designation of *Thetitis*, after the name of their vessel. It is about three feet in length, and the sexes do not differ in size.

The kangaroo-hare (*Lagorchestes leporoides*) is singularly like our European hare in colour and size, and it is tolerably abundant on the plains of South Australia. There is no difference in the size of the sexes.

The kangaroo-rat, the "putchook" of the aborigines (*Hypsiprymnus minor*), is considerably smaller than the preceding animal, being about the size of a small rabbit; it has a head very closely resembling that of a rat in shape, and although its hind legs are similar in conformation to those of a true kangaroo, it always runs upon all-fours; its prevailing colour is light-brown; dogs will not eat its flesh, which has a rank, disagreeable odour, but I knew a Frenchman who did, and pronounced it to be *excellent gibier*. It is very generally spread all over the country; the sexes are of equal size.

Bennet's wallaby, or kangaroo, is very common in Tasmania, where thousands are slaughtered every year for the sake of their hides, which make excellent leather, equal, if not superior, to the best kid—but without, as yet, causing any appreciable diminution in their numbers. This species is gregarious, roaming in large herds through the dense humid forests of its native land. It might readily, if thought desirable, be domesticated in England, as it breeds freely in confinement, and is not at all impatient of either cold or damp.

The Tasmanian jerboa (*Bettongia cuniculus*) is only found, as its name implies, in Van Diemen's Land; it is a small animal of about two feet in length, of a brownish-grey colour, and inhabits open, sandy or stony plains.

The foregoing are a few of the more remarkable species, belonging to the family of the Macropinæ, that are at present to be met with in Australia; which, however, in common with all other parts of the globe, presents indications of having been, in former times, inhabited by kindred races, far surpassing in size and strength the comparatively diminutive creatures that in this degenerate age roam through its primeval woods, or across its boundless and scantily herbaged plains.

For instance, the gigantic marsupial described by Owen, in his "Palæontology," from a single tooth, and named by him *Diprotodon*, rivalled in size the colossal sloth (*Megatherium*) of Southern America, with which it was contemporary, and was kept in check by carnivorous animals, represented in the present day by the *Thylacines* and *Dasyures* of Tasmania, one species of which at least, to use the words of Professor Owen, "had carnassial teeth two inches three lines in longitudinal extent, and was fully twice the size of a lion"!

Fig. 20.—Dog-headed Thylacinus (*Thylacinus cynocephalus*).

But these monsters have, happily, passed away for ever, and their place been taken by the existing races, which we have no reason to believe were, at any time, co-existing with them; but these, too, are surely, if slowly, disappearing from their native haunts; and although their place is no longer usurped by new creations, man and his various breeds of domesticated animals, the horse, ox, sheep and rabbit, especially the latter, are as certainly driving them from the scene they have so long occupied, as the terrible cataclysms of the older world removed their more formidable predecessors.

Owing to the vast extent of continental Australia, this exterminative process will be necessarily slow; yet when we hear of three thousand kangaroos being clubbed *en masse*, in one *battue*, and left to rot upon the ground, because, forsooth, they ate a portion of the grass a "squatter" called his, we cannot doubt the ultimate result.

Even now, within the memory of the older colonists, these beautiful and harmless, not to say useful, creatures, which, as well as the emus and opossums, were a few years ago most abundant in those localities, have become comparatively scarce, in some places they have altogether disappeared, within the settled districts; so much so, that the appearance of one of them, on Keilor Plains for instance, would certainly create as great an excitement there among the farmers, as if the same animal were to be suddenly discovered feeding on Salisbury Plains, or the Curragh of Kildare.

Is there no way, it may be asked, of putting a stop to this wholesale destruction of a curious and beautiful animal, without doubt created by the Sovereign Ruler of the universe for some wise, if unfathomable purpose?

I scarcely know; legislative enactments, I fear, would prove but of slight avail; and, most probably, would not be had recourse to, in "a free country," until too late. Much might, doubtless, be effected by the various acclimatisation societies of Europe and America, to postpone the inevitable hour of extinction; but it is unlikely, and, indeed, scarcely desirable, that the kangaroo should ever be multiplied to any great extent out of its native land; for, although its skin makes admirable leather, and its tail delicious soup, we have indigenous animals of our own which equal or surpass it, in the first, if not altogether in the last respect: and although the flesh of the young kangaroo, or joey, is reckoned tender and good, and is even compared by some enthusiasts with venison, it is not probable that it will ever tickle the public palate to such an extent as to supersede mutton in the market: accordingly, unless such a phenomenon should take place, there would be but slender chance of the Macropidæ ever increasing in this country in sufficient numbers to insure them from ultimate extinction.

A WEEK'S RAMBLING WITH A HAMMER IN THE ISLE OF WIGHT.

By W. W. WATTS, B.A.

AN account of a week's geologising in the Isle of Wight may be not uninteresting to some of the readers of SCIENCE GOSSIP, not as offering any new or original matter, but rather to induce more students to make use of this delightful epitome of Cretaceous and Eocene geology. I do not propose to give minute details of the strata, for they will be found at full length in the memoirs on the subject—for instance, the "Geological Survey Memoirs," by Bristow and Forbes, and the recent paper by Messrs. Tawney and Keeping (Q.J.G.S. May, 1881, p. 85)—but merely to indicate the general plan of work pursued, and to give a few details of the principal strata met with.

The first day was taken up by a visit to the Hamstead cliffs, where the strata from the Hamstead Corbula beds to the Bembridge limestone are well exposed. It is a wild and lonely place, overgrown by furze and wood, even down to the water's edge at high tide, and then quite impassable near the sea. The cliffs are in a terrible state of tumble-down, and great care is requisite in going about them if the weather is not dry, for the soft marls and clays are washed into a viscous mud by the rain, and this mud flows down in a kind of glacier, bearing to the sea-level a load of débris fallen from the cliffs, from which fine specimens of the characteristic fossils may be collected; many of the fossils are thus borne down and mingled with the deposits now forming along the shore line, and are not necessarily more rolled in the deposit than the recent shells there.

A detailed section is unnecessary, but a general one may be useful. At the top is an oyster bed (*Ostrea callifera*) and below it dark clays and marls, with *Cerithium plicatum*, *Corbula sub-pisum*, and *Voluta Rathieri*: then come beds with *Cytherea Lyellii*, *Corbula Vectiensis*, and at their base sandy beds with *Cerithium elegans*, *Cyrena semistriata*, and *Rissoa Chastelii*, with much comminuted shell matter. These beds make up the Corbula beds or top division of the Hamstead strata.

In the upper freshwater and estuarine marls (stiff green marl) the most important fossil is a Cypris, which occurs in a thin bed near the base. The middle freshwater and estuarine marls contain plants among which may be mentioned Equisetum, Nymphæa, and fruits which occur intermingled with Cypris remains. At the base, the well-marked "white band" full of *Cyrena semistriata*, *Melania* [illegible]*ta*, and largely made up of broken shells. The lower freshwater and estuary marls may be seen close to the shore and sometimes on the strand, and consist of dark clays and marls, with fairly abundant fossils, such as *Hydrobia pupa* and *Cyrena semistriata*, *Melania fasciata*, Rissoa, fish remains, and wood. At the base of these marls the well-known black band was easily found, with its Paludina, Cyclas, and Rissoa. While walking along the shore at low tide, beneath the exposures of the Hamstead beds we picked up a few crocodile scutes, and turtle remains, and much more rarely a fragment of Hyopotamus.

Beyond the black band, going to the N.E. we immediately came on the Bembridge marls, which were exposed on the shore, as the east winds, which had long prevailed, had cleared away the shingle. They consisted mainly of stiff green and bluish marls in certain zones crowded with beautiful shells, among which we found three species of Melania, *M. Forbesii*, *M. turritissima*, and *M. muricata*, besides *Cyrena pulchra*, *C. obtusa*, *Melanopsis carinata*. We just pushed on to the Bembridge limestone, which forms by its outcrop one of those dangerous ledges which are so common in the Isle of Wight, and then raced against the tide to secure specimens of the characteristic fossils from their best exposures, before their site was again reclaimed by the envious sea.

A heavy bag was carried back to Yarmouth after this fairly full day's work, and what little of the day remained was spent in sorting and naming the specimens, and in recording an account of the section worked through.

The next day we resolved to start from Yarmouth and work as far as possible towards Headon Hill, intending to work out and tabulate the section as carefully as we could, without spending much time in collecting fossils except those which were absolutely necessary for correlating the beds at the different exposures.

Going westwards along the shore and along the military road we came upon some exposures of the Bembridge limestone, a white tufaceous limestone, where we collected a few fossils, such as *Limnæa longiscata*, *Bulimus ellipticus*, *Planorbis discus*, and the round bodies called by the Survey turtle eggs. Over the limestone some trace of the Bembridge marls were found, having the same characters as at Hamstead.

Below this limestone, mottled green and reddish clays and marls occur, with here and there a band of comminuted shells and a very thin band of nodular limestone. This is exposed at Cliff End, and on the shore at low water may be found the highest beds of the Upper Headon, which consist of dark clays with *Paludina lenta* in fair preservation, and white bands of smashed *Potamomya gregaria*, and in one band the delicate freshwater *Serpula tenuis*. The shore is there grass-grown down to the sea-wall for some distance, and beyond, where the cliff is again seen, a little of the mottled marls is to be seen at the top and underneath the clay, with *Paludina lenta* and *Serpula tenuis*, and below that, bands of clay and a band of limestone, soft *in situ*, but forming hard blocks when exposed to weather action on the shore. Below this, clay occurs again, one band of which is noted for the profusion of *Cerithium trizonatum* and *Cyrena obovata*, which weather out very well.

Nothing of particular note now is seen till near Lynchen Chine, where a bluish clayey sand with *Potamomya gregaria* rests on a slimy clay which contains *Cerithium ventricosum* and *Melania muricata*, and in which Mr. Keeping and myself found *Cerithium concavum*. This important bed is classed as the top of the Middle Headon by Messrs. Tawney and Keeping. It holds up water, and makes the Middle Headon beds difficult to get at all along Colwell Bay. The next important bed in the Middle Headon is the so-called Venus bed (so named from its profusion of *Cytherea* (Venus) *incrassata*), which contains a considerable number of characteristic marine and brackish water-fossils, such as *Fusus labiatus*, *Natica labellata*, *Pleurotoma macilenta*, *Psammobia compressa*, *Ancillaria buccinoides*, *Balanus unguiformis*, most of which can soon be collected with the end of a knife and a little care from the greenish clayey sand which forms this bed. It is well exposed at Bramble and Colwell Chines. A curious phenomenon occurs opposite How Ledge, for the whole of the Middle Headon is replaced by a great oyster-bed packed with *Ostrea velata*, and in which may be found other fossils, such as *Murex sexdentatus*, *Melanopsis usiformis*, *Nucula Headonensis*, &c. Near, or on, How Ledge too we were so lucky as to see a very curious exposure of the basement bed of the Middle Headon, a dark clay with an immense number of specimens of *Neritina concava*, *Cyrena obovata*, *Cerithium pseudocinctum*, *Hydrobia pupa*, and *Natica Studeri*. This bed was exposed just above the How Ledge limestone on the strand at How Ledge, the long-prevailing east winds having swept it clear of shingle and stones. The Venus bed crops out a little south of Warden cliff battery.

The most notable beds in the Lower Headon are, in descending order: 1. The bed of limestone which rises from How Ledge and forms a well-marked terrace in the northern part of Totland Bay; 2. the Warden Ledge sands, rising at Warden Ledge and forming a lower terrace: their base is a band of sand with Potamomya; 3. bands of clay and limestone (with Chara and Limnæa), the lowest beds exposed by the anticlinal of this bay. Specimens of Limnæa and Planorbis may be collected, by using strong gum water, from the tumbled blocks of the limestone (1) at Warden Point. The exposures in the middle part of Totland Bay are grassed and plastered over, but here and there the limestones (3) may be observed, and the Warden Cliff sands (2) crop out in a few places, and are distinctly seen to bend over in an anticlinal near Western Chine.

(*To be continued.*)

POND-COLLECTING IN MID-WINTER.

THERE is an idea abroad among naturalists that in winter time all ponds are quite barren of life. Conchologists, I have observed, are particularly infected with this notion, but my own experience has uniformly contradicted it, although my collecting has been carried on in a neighbourhood which has a very low winter temperature.

On the 2nd of January I fished some old brick ponds near York. The net brought up crowds of *Valvata cristata*, the specimens being fine and large. It was accompanied by *Planorbis lineatus*, and the ubiquitous *P. complanatus* and *L. peregra*. From some reason, which I cannot explain, I have taken in winter larger specimens of certain shells than I could ever obtain in the same locality in summer. The three species I refer to are *L. palustris*, *L. peregra*, and *Physa hypnorum*.

The beetles were not numerous in this pond—*Hydroporus palustris*, *Noterus crassicornis* and a few of the *Philhydrida* were all I saw. However, on taking a haul in an adjacent puddle I found two very good things—*Hydroporus rufifrons* and *Agabus uliginosus*. These insects were in full vivacity—unlike the other species which appeared numb. Among the specimens of *A. uliginosus* were examples of the dull-backed female. It is a curious fact that two forms of the female are found in England, though only one is known on the continent. A striking feature in a pond-haul at this season is the number of coleopterous larvæ which appear. The transformations of these insects have only been imperfectly studied, and it would no doubt be very interesting and profitable to obtain a number of these larvæ in winter and rear them with careful observation.

In the same pond where these beetles occurred, were great numbers of *Planorbis spirorbis*, remarkable from the fact that a considerable portion of the specimens were more or less irregular in form—not scalariferous, but crumpled or waved.

Such irregularities are not easy to explain, for (as in the present case) they often occur where the water is perfectly clean and quite stagnant. In a neighbouring pond, where *Ancylus lacustris*, *Planorbis nitidus*, *Sphærium lacustre* and other species are perfectly well grown, nearly all the specimens of *L. peregra*—that paragon of hardiness—are dwarfed and strongly decollated. I shall be glad if these remarks induce any of your readers to keep their nets in order in winter as well as summer.

REV. W. C. HEY, M.A.

The Residence, York.

POLARISCOPE OBJECTS.—Can your readers give me a full list of polariscope objects, with full instructions how to mount some, including crystals, salts, &c.?—*John Alex. Ollard.*

NOTES ON *RHIZOSELENIA SHRUBSOLII.*

RHIZOSELENIA is a genus (though doubtful by some authors) of the family of Diatomaceæ. They are found both living and fossil, and though described by Ehrenberg some forty years ago, are as yet but little known, and as little understood by the general microscopist.

In a former volume of SCIENCE-GOSSIP, two species of this genus have been described and figured, and further information upon the subject is invited. I therefore offer the result of my observations upon this new species with greater willingness.

The genus has been made to include several species, to which Professor P. T. Cleve, of the Royal Swedish Academy of Sciences, seems to be making additions, all of which are interesting, peculiar and beautiful; while some from the Australian waters are exquisitely in consequence of the many important discoveries brought to notice by its discoverer, he has named it "Shrubsolii."

Shrubsolii is one of the minute species of the genus, and may be described as a long, slender, cylindrical tube, made up of sections (lorica) terminated at each extremity by a beak, or tooth, as its name implies, furnished with pocket-like impressions, and upon the opposite surface with a groove, adapted for the reception of the beak, by which arrangement any number of frustules may be united into a continuous series of indefinite length. The cell contents do not appear to pass from frustule to frustule, so that each individual has an independent existence, though possibly dependent upon each other for the performance of certain functions in their union representing the conjugation of some other forms of unicellular organisms (fig. 21).

The frustule consists of three parts, an inner, structureless membrane (primordial utricle), C; an

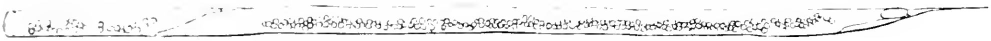

Fig. 21.—*R. Shrubsolii* by direct, transmitted rays united, and with endochrome, × 400.

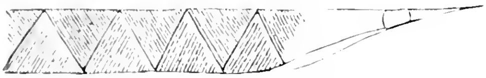

Fig. 22.—The Lorica, × 800.

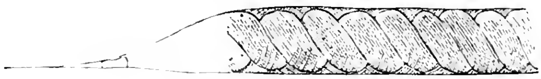

Fig. 23.—With slightly oblique light, × 800.

Figs. 24, 25, 26.—With central stop to achro condenser, × 650.

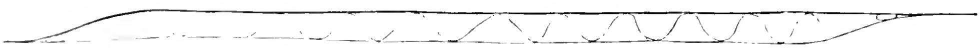

Fig. 27.—Single frustule, with zigzag line, × 400.

elegant, and may form the subject of a future note.

In the month of August, last year, W. H. Shrubsole, Esq., F.G.S., while making a boating excursion off the Island of Sheppy for the purposes of discovery, suddenly came upon a green, slimy substance, which was covering the surface of the sea, apparently as far as the eye could reach, which soon filled a net he was towing from the stern of his boat, and which, on examination at home, proved to be Rhizoselenia. The proper habitat of this great rarity in the British seas is that part of the Atlantic Ocean between Iceland and Greenland; its presence here, therefore, occasioned some interest. On a further examination by Cleve, that gentleman made a communication to the Royal Swedish Academy, and in his elaborate and valuable work on "New and little-known Diatoms," has offered reasons for regarding this subject as a new and distinct species, characterised by the course of *punctata*, composed striæ, and, intermediate inorganic, silicious coat, B; and an external organic corpuscular layer, A.

The contents of those with which I have been favoured, some in alcohol, and others (with other diatoms) in the water in which they were living, is cellular, of a grass-green colour, imbedded in a gelatinous, sheath-like, coagulable base, separated from the original homogeneous, pellicular nitrogenous layer (protoplasm). Very occasionally, however, this granular matter is found free in the liquid contents filling the frustule (fig. 21).

The form and arrangement of the *punctata* in the silicious deposit is determined by the external organic membrane, the corpuscles, or cells, of which membrane are supported by the inflexible layer of silex.

The direction of the striæ is oblique, and continuous, only to the extent of each section (lorica). There are often, therefore, many irregularities (fig. 22).

A zigzag line traverses the entire length of the frustule, and under certain conditions of illumination, this is the only marking visible, but, by the employment of unilateral oblique light, it appears as an internal spiral band, marked with longitudinal lines, that give the appearance of continuous oblique striæ to the diatoms. These appearances, however, are fictitious, the line being really due to the visible connections of the lorica (fig. 27).

As with *alata*, a species inhabiting the western coast of Sweden, it has been said that no structure has yet been discovered in Shrubsolii. If, however, appropriate manipulation and objectives are employed in its examination, it will be seen to possess all the characteristics of the genus, and will appear as a miniature imbricata.

The presence of cellulose is demonstrated by appropriate reagents.

It is scarcely possible to overrate the utility of this organism as an object of study to the student in microscopy, while it is equally valuable as a test. Direct illumination, the central spot to the achro-condenser, oblique light, and the paraboloid, each render visible details otherwise imperceptible, and present to the eye an object of great interest and beauty.

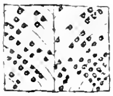

Fig. 28.—Portion of frustule, with organic membrane partly removed, × 2000.

Fig. 29.—Frustule by dark ground illumination, × 800.

Fig. 30.—Transv. Sec. of frustule, × 4000.

Fig. 31.—Scale of 1000ths.

I have thought it undesirable to state anything definite in respect to measurement for the purposes of recognition, in consequence of the diversity that prevails with the various frustules, but I have appended a scale of 1000ths, and the amplification employed in the examinations, which ranges from 400 to 4000 diam.—the powers having angles of aperture from 90° to 180°. For some purposes, corresponding oblique illumination, water immersion, has been employed.

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Examiner, Privy Council.
Wood Street, Dover.

WHITE HEATHER.—White heather seems due to the soil, as when one plant is found nearly invariably—in places in Errisainiagh, a district in Connemara. I have seen the blossoms of all kinds, white, bell heather, common heather, and ling; in other places in Connemara I have found the bell heather, a bright scarlet, but invariably when the plants were moved and cultivated the scarlet changed to purple. The white varieties can, however, be cultivated without a change.—*G. H. K.*

A CHRISTMAS FUNGUS FORAY.

On Monday, December 26th, accompanied by my friend Mr. J. T. Milow, of Scarborough, an enthusiastic collector, and who is thoroughly acquainted with every nook and corner in the North Riding, a start was made for the pine woods on Seamer moor, near Scarborough. The first find was a group of *Agaricus brevipes*, the pileus was reddish-brown (just the colour of the brown form of *Ag. laccatus*). Next, on fir posts and rails, *Næmatelia encephala* occurred in abundance, looking exactly like a brain both in shape and colour; the smaller *N. nucleata* was there also on dead thorns in the ditch. On entering the wood the first thing of interest that presented itself was *Ag. carcharias* in tolerable abundance, it is a beautiful plant, but the smell is not pleasant; close by, under a heap of fir branches were four fine specimens of *Cynophallus caninus*, a plant tolerably common here, it has a faint though decided odour, which is by no means unpleasant. Further on *Ag. tenacellus* was abundant on fir-cones, and along with it, on the ground amongst the fir-leaves, a plant differing in having a much longer rooting stem, and the pileus striate at the margin; it may be *Ag. stolonifer*, perhaps not. Good things were continually presenting themselves. The under side of a fallen holly was covered with *Nectria flavida*, giving it the appearance of having been washed over with chrome yellow; *N. aquifolia* of a brighter red than usual, monopolised another dead trunk yet standing. A bright lilac *Peniophora*, with a persistent sulphur-yellow strigose margin and bright brown metuloids, rough at the tips, and bifurcate at the base, was found on fallen trunks, and does not agree in all particulars with any species we are acquainted with; if new, it might with propriety be *P. strena.* Jews' ears (*Hirneola auricula-Judæ*), so called, because in form they somewhat resemble the human ear, occurred on elder. *Lactarius insulsus* and *L. hypothejus* were also there, the former has a very unpleasant smell. On leaving the wood, a furze cover was entered, and presented a sight never to be forgotten, and compared to which the "Field of the cloth of gold" must have been very poor indeed. During the autumn a fire had spread over the cover, leaving only the blackened furze stems, most of which were now covered with a luxuriant growth of the bright orange *Tremella mesenterica*, twisting and curling its gelatinous substance into every conceivable shape, and contrasting well with the blackened surroundings. Lower down on the stems dense clusters of the beautiful *Ag. velutipes*, with dark brown, velvety stem and rich orange-brown cap, shading off to yellow near the edge, formed the transition step from the bright orange above to the rich brown peat below. A search on the furze stems for the remaining British *Naematelia*, *N. virescens* was made, and for some time without success; at last, "I have it," was heard at a distance, and in my hurry to see what we had entered into a league to find, if possible, before going home, caught my foot against a stump, and "brought up," as the sailors say, in the very heart of a dead furze-bush. The work of the next few minutes can be more readily imagined than described. After collecting my specimens, for, as a matter of course, the vasculum flew open, we turned homewards, the last thorn taken from a damp ditch yielding a splendid group of *Prototrichia flagellifera*. Altogether sixty-two species of fungi were collected, also a few mosses and lichens, and the day, although at a season when pseudo-naturalists imagine there is nothing to do in the country, proved one of the most enjoyable of the many we have had together.

GEORGE MASSEE.

HOLIDAY RAMBLES

IN FAR KINTAIL.

By G. C. DRUCE, F.L.S., Hon. Sec. Oxfordshire Nat. Hist. Soc.

"THE wettest and coldest summer I can remember," said the guard of the Strome train as, tired with the long journey, we got out at Strome, the terminus of the West Ross-shire Railway, which for the last few miles had run close by the side of Loch Carron; and we were by no means inclined to contradict his statement, since, whether stopping at Achnasheen, that focus of all the wind of the west, or struggling down Glen Docharty against driving rain or mist, when not even the sundews could look cheerful, or the golden saxifrage bright, or simply waiting for the sun that would not appear except in fitful gleams that served only to reveal heavy showers scudding across towards the east. Then again dense whirling, driving mist, hiding Loch Maree and its grand rocky ramparts, then again cleared by some mighty gust rushing over the lake, raising its waves till they rolled in sea-like size, and blowing back and upwards the waterfalls on Ben Slioch till the mountain looked as if some huge peatfire were smouldering in its corries, while the strangest contrasts of colours were seen along its slopes, as we watched it from Kinlochewe, waiting for the summer sunshine that did not come. So that when we heard at Strome that this made about the twenty-eighth wet day our spirits fell almost as low as the barometer, and our expectations of revealing great treasures in Ross, faded more and more; however the evening was sufficiently clear to admit of a walk back along the railway towards Attadale, the line being made at the base of lofty hills which have been here and there cut through to form the line; down these hill slopes we counted in two miles twenty-one waterfalls of respectable size, by whose sides grew ferns in great profusion, principally common ones, such as *Filix-fœmina*, *dilatata*, *spinulosa*, *Blechnum*, *Adiantum-nigrum*, *Phegopteris*, *trichomanes*, *Cystopteris*, *Dryopteris*, *Oreopteris* and *Ruta-muraria*, but in one place a great mass of *Hymenophyllum Wilsonii* intermixed with *Hypnum triquetrum* and *splendens*. Here and there a few globe-flowers yet retained their lovely lemon-coloured petals, and the yellow composite *Crepis paludosa* was as common as elsewhere in West Ross. The hawkweeds, *Anglicum* and *vulgatum* occurred on these rocks, which also were enlightened here and there with the pretty *Sedum Anglicum*; here, too occurred the only *Orchis mascula*, *Asperula odorata*, and *Scilla nutans* noticed in the vice-county. The shores of Loch Carron are most decidedly rocky, and maritime rocks mean no great variety of flowers, *Atriplex Babingtonii* and *Silene maritima* being almost the only plants able to subsist in this shingly home, but nearer Attadale the stones became smaller and sufficiently mixed with mud to form a little saltmarsh on which were found *Blysmus rufus*, *Glaux*, *Triglochin maritimum*, *Lepigonum rupestre*, *Cochlearia officinalis*, *Juncus Gerardi*, and *Sueda maritima*. On the shingle were some fine specimens of *Zostera marina*, and brilliantly coloured Echini. Here it will be well to explain that the principal object in visiting West Ross was to make a list of all plants met with, as it is almost the only county which has no record of its common plants in "Topographical Botany," or in subsequent publications of the Botanical Record Club, and Mr. Watson (whose recent death all botanists must lament, the gap made being one most difficult to fill) was very anxious to get Western Ross worked before republishing "Topographical Botany."

To resume: the noting down of every plant seen led one to ponder over the absence of plants, sometimes the almost unaccountable absences; for instance, up to this time about a hundred miles had been walked in West Ross without seeing *Helianthemum vulgare*, *Crepis virens*, *Silene inflata*, or *Triticum repens*. On the rail near Strome the three latter were seen, as were also *Arenaria serpyllifolia*, *Cardamine hirsuta*, *Papaver argemone*, and *Vicia sativa*, the four latter probably introduced. *Iris Pseudacorus* was frequent; here too for the first time were noticed *Arrhenatherum avenaceum*, *Sinapis arvensis*, *Lapsana* rare, *Heracleum*, the third Umbellifera seen. Many plants, the commonest weeds in the South, were here welcomed with avidity, gloating upon *Lychnis Flos-cuculi*, and *Galium Aparine* or shouting with glee at *Sonchus asper* and *Arctium minus!* Nearly eighty miles had been walked in West Ross before *Urtica dioica* was seen, and then only on what remained of some Highland shieling, now depopulated and dismantled. *Anagallis tenella* was never seen at all, although its congeners *Pinguicula Lusitanica*, *Molinia*, *Drosera Anglica*, *rotundifolia*, and *Rhynchospora alba*, were frequently found.

From Strome we walked to Loch Alsh, and after breasting the first hill, we again were reminded of Connemara. It is true here were no beautiful bells of Dabeocia to gladden the eye, nor could Eriocaulon be found in any of the lakes; but from the black peaty soil, if soil the wet, treacherous bog could be called, with its profuse growth of sombre (I refer to the general effect of colour) *Erica Tetralix*, bog-myrtle, *Drosera*, *Molinia*, cotton-grass and rushes, and in the squalid poverty of too many of its cottages, in the damp, relaxing atmosphere, and its "contiguity to a melancholy ocean," there was a great similarity to the West Irish coast. Like also were the frequent inlets of the sea into the coast line; but in Ireland surely no mountains rise up in such grand outlines as these hills of Kintail, which are now coming into view, or those to the west, those spiky Cuchullins of Skye. Between Loch Alsh and Loch Duich occurred some interesting ground, and also a heavy shower, which in Ireland would be called one of St. Patrick's blessings, but was here rather attributed to some malevolent agency. Yet there is one advantage even in such a shower, that is, when you are quite wet through, you hesitate less about wading knee-deep in such a swampy place as this after *Sparganium minimum*, *Utricularia intermedia*, *Œnanthe crocata*, *Parnassia*, *Comarum*, *Carex curta*, and *Pedicularis palustris;* and then there is some consolation when you get on the hard road again, and the clouds have gone past, now kissing the peaks of Ben Attow and Scuir Ouran, those guardian monarchs of Kintail and Glen Shiel, that every step you take brings you nearer and drier to them. At Dornie a little ferry-boat takes one across the lovely Loch Duich, passes near Ellandonan Castle to the south side of the Loch: here in a garden *Lamium purpureum* greeted us, the second specimen seen north of the Caledonian; *album* had not been seen since Blair Athol; in the six or seven miles walk to Shiel House by the Loch, *Petasites vulgaris*, *Scirpus sylvaticus*, *Armeria*, *Bartsia odontites*, and a single plant of *Chærophyllum temulum*—the sixth and last Umbellifera—was noted. *Corydalis claviculata* grew on some thatched roofs near and on the slopes of Mam Ratachan at some considerable elevation, Oxyria, and *Botrychium Lunaria* were gathered; *Saxifraga aizoïdes* as elsewhere in Ross from the sea-level upwards being abundant.

(*To be continued.*)

NOTES ON THE NATURAL HISTORY OF JERSEY.

By Edward Lovett.

[*Continued from page* 271.]

Later Geology.

Before leaving the subject of the Geology of Jersey, there are two important branches of what we may consider *later* geology, which claim our attention. One of these is the presence in Jersey of geological material foreign to the locality, and the other is the existence of implements of various prehistoric periods which have from time to time been found in the island.

As regards the former, we allude to the presence of considerable quantities of flints which occur on the shores of many of the bays, particularly those of St. Ouen and Grouville. Now, as we have pointed out in a former paper, Jersey is composed of syenites, diorites, clayslate, &c., and the presence of chalk flints in such a locality is of itself sufficient to cause a certain amount of interest as to their origin, and we believe that some rather elaborate theories have been at times entertained regarding them; but we shall endeavour to point out that it is simply one of those instances in which the "resources of civilisation" have been the cause of a somewhat remarkable rult, when viewed from a naturales standpoint.

In almost all parts of the world, near ports, it would be possible to see evidence of this, in the fragments of geological material foreign to the locality that strew the shores, and on a visit to Hastings some time since the writer recorded thirteen varieties of rocks and minerals belonging to far-removed strata which were lying exposed at low tide on one of the wildest and least frequented parts of the coast, near Fairlight. Without enumerating many other similar instances, it may perhaps be of interest to give a few statistics connected with a port whose imports largely exceed its exports, and where, in consequence, an enormous amount of the local rock is taken away as ballast to be deposited in places to which it bears no affinity whatever, indeed probably giving rise in some cases to problematical theories as to its origin.

The average monthly number of vessels (in the year 1880) leaving the port of Rio de Janeiro in ballast was thirty-nine, or four hundred and seventy for the year. The amount of ballast required of course varies considerably, according to the tonnage of the ship, her build, where she is bound for and a variety of other causes; but the average proportion is about a fifth of the tonnage, so that a ship of a thousand tons would take about two hundred to two hundred and fifty tons of ballast. A large business is done in this ballast, which consists of a bluish syenite, of which the hills round Rio are composed. From these few figures it will be seen what an enormous amount of material is removed from a given locality to others in ten or twenty years, simply in the form of ballast.

We will now return to Jersey. We find that in the year 1860, 165 vessels with a gross tonnage of over 3000 tons were employed in oyster catching; the destination of these oysters was, no doubt, England, and it is most probable that these boats took temporary ballast, even as many colliers do now, by helping themselves to the shingle of our south coast shores. But although the oyster beds of Jersey are of so little value now, it was even before 1860 that very large quantities were obtained for the English markets; add to this fact the number of small boats that otherwise traded with the island, and we shall see that, great as is the quantity of flints that are met with, their existence may most probably be thus accounted for, considering, too, that they are most abundant

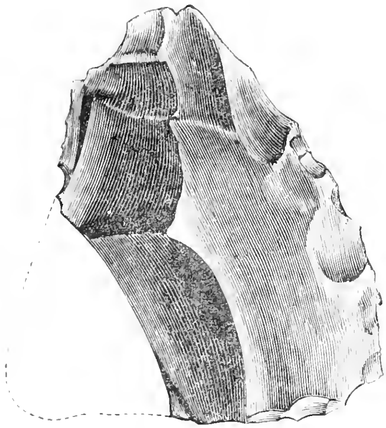


Fig. 32.—Spear-head (N.S.)

where currents tend to deposit any such "jetsam." We have also obtained rolled fragments of Devonian fossils from the shore of Grouville Bay, which are obviously traceable to a similar cause.

It will thus be seen that in all questions of this kind there are many things that may be worth considering before arriving at any fixed conclusion, for, taking the phenomenon to which we have before referred, namely, the encroachment of blown sand in the district of St. Ouen's Bay, we might at some future period obtain this complicated problem—hills of blown syenitic sand, at the base of which is a band of chalk flints, the whole overlying a weathered surface of clayslate.

We will now consider the various evidences of the existence of prehistoric man as shewn by the very remarkable series of implements, ranging from the crudest type of palæolithic flint weapons to the more developed and finished ones of bronze and polished greenstone that have been discovered in Jersey.

Perhaps the most interesting facts in connection with a consideration of such objects of remote human work is, that it undoubtedly refers to a time when Jersey, with the other Channel Islands, formed not only a part of the continent, but was even included with England in that connection; for we shall see that the flint from which the implements in one small cave were formed is decidedly not of one

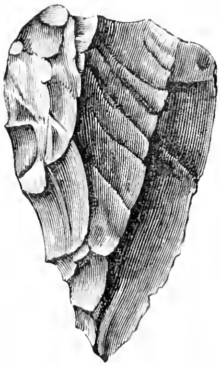


Fig. 33.—Small Spear-head (N.S.)

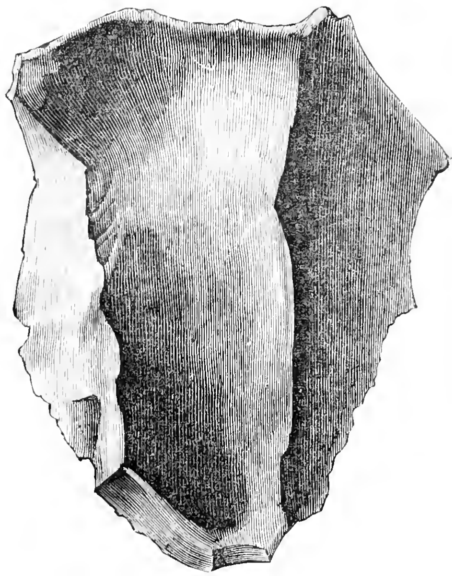


Fig. 34.—Spear-head (N.S.)

kind, but was in all probability derived from several different cretaceous localities.

The existence of large mammalia, as proved by the discovery of a bone of *Bos primigenius* at St. Clements, also supports this theory, were such support necessary.

On all the high headlands round the coast of the island, wherever the virgin soil has been turned up to any extent, or where peat has, for some purpose or other, been removed, flint chips are to be found, in some few cases in considerable numbers, and in small patches. Now leaving all other considerations out of the question, it would be remarkable to find flints buried in the peat overlying the syenites and other old rocks of a small island like Jersey; but in nearly every instance these chips show unmistakable signs of having been brought there and fractured by artificial and not natural means, the bulb of percussion being clearly seen on them, particularly those that are newly excavated—for many are to be seen on cultivated ground that, through long exposure and damage by farm implements, are by no means so conclusive, and these we would prefer to pass over altogether in favour of those that were actually taken from beneath the surface.

It was not, however, until we had the good fortune to obtain a large number of these flints from a cave deposit on the north coast of the island that we appreciated the extent to which these very early implements occurred.

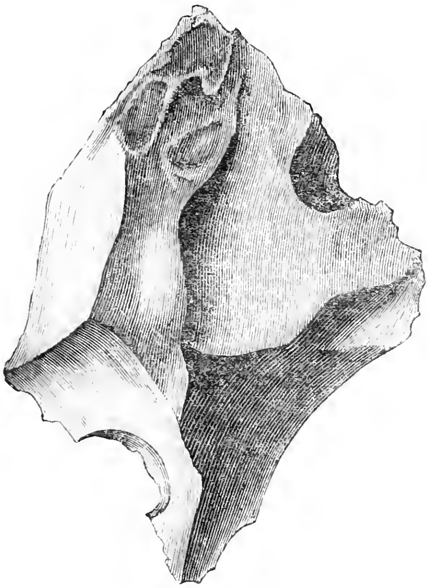


Fig. 35.—Drill (N.S.)

The cave in which this most interesting discovery was made is one of the kind already alluded to as occurring in the syenite; and the boulders, which not only protrude through the floor, but form a sort of rough shelf outside, are evidences of the breaking out of the internal core by the continuity of the lines of fissure. The cave itself is situated some sixty feet above the sea-level, hence its floor has been undisturbed by the wash of the waves; it is of rather small dimensions, being only about twenty-five feet long by ten or fifteen feet wide and about the same in height. Its floor is covered by a clay formed by the decomposition of the felspar from the roof and sides; the present depth of this clay varied much, owing to the cave being so exposed to the weather, the rain having evidently washed a considerable quantity from that part of the floor near the entrance, forming a little platform outside and exposing many of the flint implements which were sticking out here and there, and in some cases quite uncovered.

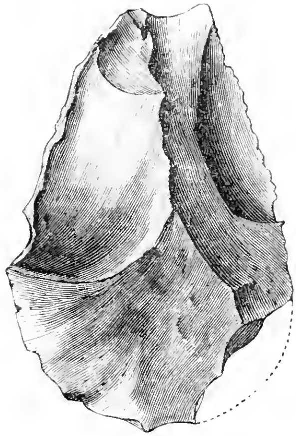


Fig. 36.—Small Celt (N.S.)

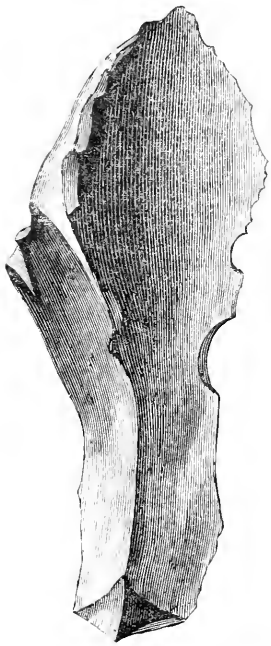


Fig. 37.—Duck-bill Scraper (N.S.

Below the "clay," which might possibly have been about six or nine inches in thickness, there was a stratum of sand of about four inches thick, below this again was a band of about two inches of a dark brown cave earth, and beneath this, sand again, but it is hoped that a careful investigation and record will yet be made of this most interesting cave.

As regards the implements and chips that were obtained from this deposit, we have already stated that they represented flint of several distinct varieties, many being of the characteristic rich black colour, whilst others were very pale, in some instances resembling chalcedony, and in others being much impregnated with carbonate of lime. A few fine examples of banded flint occurred. Amongst these were several small celts; a fine broad spearhead; other spearheads of a smaller size, about an inch and a half in length; knives varying from an inch to two inches in length and half an inch in width; saws having a very fine serrated edge; several drills, these were curiously enough found together and were all of one type, the apex being slightly turned like a screw, their size was about two inches long and the same in breadth; one or two piercers; a fine duck-billed scraper; other scrapers of various patterns; a sling-stone and a number of flakes—possibly used as arrow-heads.

Besides these there was a quantity of cores, rough chips and faulty pieces, that showed signs of having been commenced, but were possibly discarded for a better piece to work upon.

There were also a few other objects associated with the above which were of equal interest; amongst these were two or three broken shells of a species of *Patella*, and a worked fragment of clay slate bearing several scratched marks.

It is impossible to conjecture what may yet be found in this remarkably favoured resort of palæolithic man, but it is probable, considering the richness of this one cave, that many others in the neighbourhood to which the sea has access, were as much frequented, and would have yielded as rich results, had not the sea cleared out their floor deposits. Again, referring to the flints themselves, they are evidently of that early palæolithic form which shows the gradual development to the more finished implement, but they are not at first sight of an attractive shape. An interesting fact in connection with them was the discovery of a celt broken into three pieces, and although each portion was found some inches from the other, but on the same level, they fitted as accurately as if recently fractured.

Of flints of the later periods, there does not appear to have been any discovery as yet, but the implements of the polished type are mostly made of syenite, greenstone, &c. These have been found in considerable numbers from time to time, and have either been discovered when removing the earth in the neighbourhood of a tumulus or cromlech, as we shall presently see; or have, as is frequently the case, been turned up by the plough. A remarkably beautiful greenstone polished celt was found in a clay bank at La Hougue bie. Implements of the bronze age are also of by no means rare occurrence, and on one occasion, according to the proceedings of *Société Jersiaise*, seventy-two bronze implements were found in a field at St. Lawrence; similar weapons have also been discoved at Rozel, which is in another part of the island. From this it would appear as if implements of the several different periods were very generally distributed over the island, and not rigidly confined to any particular spot.

One incident of great interest in connection with this subject must be noticed.

Some time since a human skull of remarkable type, having the forehead very low and flat, was dug out of Green Island, and subsequently bones were also found, but we are not aware that any observations were made on the latter; we believe, however, that the skull is carefully preserved.

In the proceedings of the *Société Jersiaise*, above alluded to, we see that the following objects (*inter alia*) of prehistoric interest have been recorded as having been found in Jersey:—

From a tumulus, St. Brelade; spindle-whorl, fragments of flint, stones bearing certain marks, &c.

From a cromlech, Beauport; flint arrow-head, fragments of pottery, stone weapons, &c.

From various localities are also recorded a number of "*stone*" implements, for many of which no precise locality is given.

For some valuable information in connection with this interesting subject, which we have only been able to treat in a somewhat brief manner, we are indebted to E. K. Cable, Esq., of St. Martin's, Jersey.

(*To be continued.*)

THE GEOLOGISTS AND THE MOON.

COME, let me sing with scientific pride
What great effects befell from solar tide
On earth when molten; throb succeeding throb,
Tore from her bosom an enormous blob.
Then Earth no longer rolled along forlorn,
For Moon, refulgent lamp of night, was born.
She, circling round with unrelaxing sway,
Knocked out of time the swaggering lamp of day,
And Mother Earth, when in this state of heat,
With throb responsive to her offspring beat.
But as with each increasing sweep they part,
Old age and distance cooled maternal heart.
But still it beats, as we can see full well
And measure in the ocean's tidal swell.

Thus Darwin says, but others would improve:
Inventive ardour Ball and Fisher move.
This birth, great Ball alleges, left no scar;
But Fisher sees more deeply, and as far,
And points, in proof of parturitive motion,
To the great rents, within which lies the ocean.

Thus saying he's well pleased to rest his case in
The physical condition of the ocean basin.
But Ball, with vision clear as light of lime,
A-glimpsing down the Corridors of Time,
Sees what no scoffers ever may deride,
That is, he sees six hundred feet of tide !
Oh, what a sight to make the sea-sick ill,
Oh, what a power existed in this mill
To plane the earth and cut off mountain-tops,
Or get in geologic time with skips and hops.
This Hull most quickly sees and thus explains
The denudation of his sea-like plains.

Thus moonstruck do these "swells" of science raise
A chorus loud and long to Darwin's praise ;
But fear fell on his soul, and in defence,
He disclaims all their mighty inference.

A CONIFER.

MICROSCOPY.

DRAWING, &c., FROM THE MICROSCOPE.—In reference to the valuable paper by E. T. D. on "Drawings and Paintings from the Microscope," in the January number, will you allow me to suggest what I think a preferable material to cardboard or paper, especially if the drawings are made of the size he mentions. If pieces of finely smoothed glass are obtained, it is as easy to draw or paint upon or sketch outlines upon with camera lucida as it is upon paper. Every detail possible in the one case is possible in the other, and it may be rendered a work of art in every sense just as easily. In fact, the amount of finish is only limited by the skill of the painter or draughtsman. Such drawings can be coated with varnish or have another piece of glass cemented upon them with Canada balsam ; if transparent colours have been used the drawings can be thrown upon the screen or on a white wall by the lantern, and thus be viewed in all their beauty (but greatly enlarged proportion) by a large number of spectators at once. Beautiful pencil drawings can be made in the same manner and coloured to any required extent, and if it be desired to alter, the drawing can be partially or, if necessary, wholly removed without deterioration of the surface upon which it is made. A background of white paper is all that is necessary to enable us to look at such transparent paintings or drawings as ordinary paintings. This method of preparing illustrations of microscopical objects was originally described in the *Monthly Microscopical Journal* of February 1874, by the Rev. Mr. Dallinger, who has made more than a thousand of them to illustrate his lectures. It is unnecessary to add that his representations are perfect. Even to illustrate an ordinary paper this method possesses an advantage over every other, which I will not occupy space in referring to, but merely mention one which I can confirm from practice myself—that very indifferent skill will produce tolerably satisfactory transparencies for the lantern, and suffice to convert an otherwise uninteresting paper into an attractive one. E. T. D. omitted to notice that outlines produced by camera lucida are reversed. This introduces a little difficulty when filling up from the microscope. The slide can be turned over with low powers while outlining, but this cannot be done with a high power.—*Edwin Holmes.*

"THE MICROGRAPHIC DICTIONARY."—We have received all the parts up to and including Part VII. of the fourth edition of this invaluable work, brought up so as to include the most recent microscopical researches.

MOUNTING FOR HOT COUNTRIES.—I should be greatly obliged if any of your readers, who may have had experience in mounting in Canada balsam and dammar varnish in India, would give me a few hints on the subject. (1) I find that the following method succeeds better out here than any other. Centre the object on the slide, drop on it the requisite quantity of balsam, and then transfer it to the air-pump for a quarter of an hour or twenty minutes. Any air confined in the object or the balsam is thus brought to the surface, and the resin finds its way into the vacated air-spaces. On removing the slide from the air-pump I heat it till the balsam becomes glassy (and just short of boiling) and this generally causes the bubbles brought out under the receiver to flow to one side. Whether mounted in this way or without the air-pump, at least four, sometimes six, weeks elapse before the balsam sets. Is the delay due to climatal influences, or to some error in my process ? Can the setting of the balsam be *safely* expedited in any way ? (2) There is at least as much delay when I use chloroform and balsam. I had my solution prepared by the first chemists here, and instructed them to evaporate the balsam to glassiness before adding the chloroform. In the majority of cases the mount becomes slightly milky, and a power of sixty diameters shows the presence of *minute* particles, which close and continued observation proves fall with the slope of the stage, and this even in the case of objects that have been mounted for over six months. My objectives are not sufficiently powerful (310 diameters being my highest) to enable me to determine what this foreign matter is. I conclude it is condensed vapour, and not air, from its *falling*. A damp wind, as from an open window in our "rainy season," blowing on the chloro-balsam produces a scum and increases the number of particles. Heating as recommended in the text-books, dispels the cloudiness for the time, but some of it returns when the slide has cooled, or after the lapse of a few days. What is the cause of these failures, and how can they be obviated ? (3) In using dammar varnish I meet with as much disappointment. I got my varnish out from Messrs. C. Baker & Co., and I have no doubt that my want of success is due either to my ignorance or to the climate. My method of using the varnish is this: placing the cover on the object, I take the varnish from the bottle with a fine pointed glass tube, and, applying it to the edge of the cover, capillary attraction "runs it in" around the object. The varnish does not set. I thought that by putting a light ring of gold size round some of my dammar objects I should fix the cover, and thus prevent it from slipping about, but in twenty-four hours the cement had run-in in several places all round the cover. Again—and this occurs, though to a less extent, with chloro-balsam—vacant, bubble-like spaces break out all round the edge of the cover, as if the varnish had dried out, and the introduction of additional varnish does not mend matters. How are these failures to be explained? I may add in conclusion, that my own experience leads me to say neither chloro-balsam nor dammar varnish give such good results out here as balsam used by itself in the way pointed out above, viz. with the air-pump. I have mounted many objects in cement cells with glycerine, either pure or diluted, using Shadbolt's turn-table with complete success. It must be remembered I write in India.—*W. J. S., Calcutta.*

Fineness of Striation as a specific Character of Diatoms. — Under this title Professor H. L. Smith, Hon. F.R.M.S., has reviewed (see the "Amer. Month. Mic. Jour." No. 12, vol. ii., which, by the way, with the "Amer. Jour. of Microscopy" should be in the hands of all those interested in microscopical studies) the translation of Count Castracane's paper in the October number of the "Journal of the Royal Microscopical Society:" "On the value to be attributed in the Determination of Species to the number of Striæ of the Diatomaceæ," to which are appended some criticisms of my own. Count Castracane arrives at the conclusion that "the striæ and their fineness are qualities of specific importance. As Professor Smith's views are in perfect accordance with my own, I propose to give a résumé of his paper." The conclusion of the Count, however, will be heartily welcomed by species-mongers, inasmuch as one need have little fear in being able to sustain the claim to *n. sp.* if allowed to fall back upon striation as the test, for who shall decide? Not every one has at command the elaborate apparatus used by Count Castracane for determining the number of striæ. Photographs of each diatom-projection on an enlarged scale, &c., seem to be considered by him as the only trustworthy method—a method of such exactness that "it enables him to disagree with microscopists of incontestable authority." The Diatomaceæ belong to the vegetable kingdom and the principle governing their classification need not be very different from those accepted for other portions of the vegetable kingdom. I do not suppose that Count Castracane would for a moment assert that *Stauroneis phœnicenteron*, e.g., has the same number of striæ in ·001 of an inch as *S. gracilis*, and yet I have frequently found the latter conjugating, and the sporangial frustule is *S. phœnicenteron.* There are a great many diatoms of the *Navicula firma* (not *pinna* as erroneously printed, F. K.) group, which really pass into each other so gradually that even by the help of striation it is difficult to distinguish them; *N. affinis* produces by conjugation true *N. firma*, and I have even observed the large frustules of the latter again producing monsters by conjugation far more coarsely marked than the parent frustules. Shall we consider the sporangial form as one species and the parent form another? . . . I am quite prepared to admit that a preparation of the so-called *Frustulia Saxonica*, for example, will not show any appreciable difference in the striation of the frustules; but I should be quite unwilling to admit that this diatom could not be obtained from another locality considerably more finely or more coarsely marked. Indeed Count Castracane himself admits a difference, though he says it has never exceeded $\frac{1}{5}$, which, as Mr. Kitton shows, gives a range in *N. crassinervis*, if he understands aright, if 27 to 35 in ·001 of an inch! . . . Any one looking over Mr. Habershaw's "Catalogue of the Diatomaceæ," will realise what a frightful increase of species was made by Ehrenberg and the earlier observers from considering the number of rays in achnocyclus as of specific value. Equally pernicious is the custom too largely indulged in by many observers, who, looking from the standpoint which Count Castracane appears to advocate, find at stated intervals new species founded upon little else than finer or coarser striation, or perhaps somewhat different outline. It is no doubt quite a comfortable way of working and keeping one's name before the public, when one finds what is supposed to be a new diatom; if only knowing enough to distinguish the genus, one measures more or less correctly the length, breadth or diameter, and the number of striæ in ·001 of an inch, giving sometimes a representation which, if it be one of the smaller *Naviculæ*, may too often represent many other forms, and finally to coin some unpronounceable word, or immortalise some friend and send forth the bantling, since nobody can venture to question its legitimacy; for does it not differ somewhat from every form hitherto figured or described in outline? and has it not a few striæ more or less in the ·001 of an inch? I shall be very sorry if, in what I have said, I am considered as censuring men who are unquestionably hard-working and conscientious students of these interesting little organisms. I am only regretting that, instead of labouring to reduce the genera and species of the Diatomaceæ and seeking for a broader and firmer principle to guide in their study and classification, so many worthy persons are contented to accept trivial distinctions as of generic and specific value, and that they are so encumbering the subject that some day it will be crushed by its own dead weight, giving place to a new structure utilising as far as possible the ruins erected upon a more solid foundation. These are surely the words of truth and soberness, and apply with equal force to the fungologist, botanist, entomologist, ornithologist, as to the diatomist. In fact, the students in every branch of biology may in this respect, with few exceptions, cry: "*mea culpa, mea maxima culpa*."—*F. Kitton, Hon. F.R.M.S.*

ZOOLOGY.

LOCAL NAMES, CO. FERMANAGH.—Yellow Bunting (*Emberiza citrinella*), "Yellow-yorlin"; Coot (*Fulica atra*), "Baldy"; Cormorant (*Phalacrocorax carbo*), "Cormorel"; Lesser Grebe or Dab-chick (*Podiceps minor*), "Puffin"; Heron (*Ardea cinerea*), "Crane"; Kingfisher (*Alcedo hispida*), "Blue-bird"; Cushat or Ring-dove (*Columba palumbus*), "Wood-quest"; Jack Snipe (*Gallinago gallinula*), "Weather-blate"; Starling (*Sturnus vulgaris*), "Starbird"; Missel Thrush (*Turdus viscivorus*), "Jay"; Newt (*Triton punctatus*), "Man-keeper"; Horse-leech (*Hæmopis sanguisorba*), "Lough-leech"; Large Moths, "Bats"; Stickleback (*Gasterosteus*), "Stridley"; male ditto (when in bridal attire), "Red Roach"; Freshwater Mussel (*Alasmodon margaritifera*), "Slig"; Lampern or River Lamprey (*Petromyzon fluviatilis*), "Ramper Eel"; Shrew (*Sorex vulgaris*), "Grass-mouse."—*J. H. H.*

NORTH MIDDLESEX NATURAL HISTORY ASSOCIATION.—A society has just been founded bearing the above name, of which Mr. W. J. V. Vanderberger is President, and Mr. C. M. Allan, Secretary. The temporary address of the Association is 29 Ingleby Road, Grove Road, Holloway, N.

RÉAUMUR AND THE GERM THEORY OF DISEASE.—It has struck me that some remarks I recently met with in the fourth volume of Réaumur's Mémoires, (in the end of the tenth Mémoire, on viviparous diptera, pp. 432–6,) would not be without interest at the present time. After relating some experiments with vegetable infusions in tubes, from which he concluded that, since boiling killed all organisms contained in them, any life subsequently developed in such infusions must have come from without (p. 432), he leads up to his hypothesis with the following noticeable sentence, (p. 434). "Ce que nous sçavons de mieux en physique, est assûrément ce que nous pouvons voir, mais pourtant nous pouvons y étendre nos connoissances par-delà ce que nous voyons." With him, as with Tyndall, "the vision of the mind authoritatively supplements the vision of the eye. By an intellectual necessity he crosses the boundary of the experimental evidence," &c., [Belfast Address. Fragments of Science, 5th ed. p. 524.] He uses the same algebra of the imagination in postulating an unknown quantity to be afterwards tested by reason and experiment. He goes on (p. 435) to say: "It is then extremely probable, it is perhaps only too true, that our air is peopled with winged insects; and perhaps these little insects, whose existence is not even suspected by men in general, are more formidable for us than those which we actually know to be venomous, as scorpions, tarantulas, &c. Some years may be much more favourable to their multiplication than others, as there are years more favourable to the multiplication of different species of caterpillars, locusts, flies, gnats, &c. In some years the air may be excessively loaded with these little flies,"—(flies, I should say, which he supposes to be of microscopic size developed from infusorial animalcules, and in which what we now call *Muscæ volitantes* may possibly have an objective existence [pp. 433–4])—"so loaded that with every breath we draw thousands, nay, millions of them into our lungs. . . . . The heat there is able to kill them instantaneously, or at any rate, unable to fly, they remain in the air-cells, where they cannot thus accumulate and corrupt, without our suffering from it. Many epidemic diseases which attack a whole town, and even a great extent of country in a brief time, may have a such-like cause. How do we know but that the colds to which the name of *follettes*, is given, and which have been attributed to fogs, may be caused by an atmosphere too full of insects? The air does not enter only our lungs; it is mingled with our food, it passes into our stomachs, and the foreign bodies with which it is filled pass there with it. We see the caterpillars, the locusts, which ravage our fields; but if there are insects of a prodigious minuteness that commit ravages as great within our bodies, those we are unable to see." With regard to what Réaumur includes under the term *insect*, it may be right to say that he (vol. I. p. 58) would make it cover every animal not included in the mammalia, birds and fishes—not only all arthropoda, mollusca, radiata and infusoria, but, as "La grandeur d'un animal ne doit pas suffire pour l'ôter du nombre des insectes," all reptiles, even crocodiles and alligators. —*J. A. Osborne, M.P., Milford, co. Donegal.*

THE GREY PHALAROPE (*Phalaropus lobatus*).—A specimen of this beautiful little bird was brought to me on the 12th of December, having been shot by a fisherman of this village in close proximity to the Thames. It has likewise been shot in other parts of the country this winter according to the *Field* newspaper. Is it not a somewhat uncommon occurrence to meet with this sea-bird so far inland? Its summer home is the Arctic regions.—*W. H. Warner, Standlake, Witney.*

WHAT RELATION DOES THE POSITION OF THE EMBRYO OF THE CHICK HOLD TO THE LONG AXIS OF THE SHELL?—In the "Elements of Embryology" by Foster and Balfour, Part I, page 46, it is stated: "If an egg be placed with its broad end to the right-hand of the observer, the head of the embryo will in nearly all cases be found pointing away from him." In the second volume of Balfour's "Comparative Embryology," page 146, the position of the embryo of the chick is defined thus: "Its long axis is placed at right angles to that of the egg, and the broad end of the egg is on the left side of the embryo." Can these statements be reconciled? or which of them is to be accepted?—*J. A. O.*

"THE BUTTERFLIES OF EUROPE."—Part VI. of this beautiful work has been sent us. Its illustrations fully keep up the high art character we have had to eulogise in previous numbers.

THE UNICORN.—All readers interested in the zoology of mythology will read with delight a pamphlet published by Messrs. Longman, and written by Robert Brown, jun. F.S.A., called "The Unicorn: a mythological Investigation." All that great learning, acute scholarship, and extensive knowledge of the subject can bring to bear, is here very pleasantly concentrated on the fabulous animal which has been playing a part in mythological and heraldic history since the days of the ancient Assyrians, Greeks, and Egyptians.

BOTANY.

LUZULA NIVEA.—"Panicle decompound, falling short of the floral leaves. Stalks about 6-flowered. Sepals lanceolate, acute, without mucro; outer ⅓ shorter than inner. Leaves hairy. Flowers *very white*. Perennial 6, 7. Alpine valleys. France, Switzerland, North Italy, Tyrol."—Wood's "Tourists' Flora." This plant was gathered by me last summer in Damside Wood, about thirteen miles south-west of Perth and little more than a mile from Auchterarder. Auchterarder consists of one principal street, about a mile long. It is built on the side of a low hill, and the motto on its arms is—"A city set on a hill cannot be hid." It was burned by the Earl of Mar in 1715, after the battle of Sheriffmuir, that Argyle and his followers advancing in pursuit might find no shelter. The wood is a mere strip, extending for about half a mile by the side of the road which leads from Perth to Glasgow. It consists for the most part of firs, though the elm, the oak, the beech, with "grey, smooth trunk," the "siller saugh," and the hoary birch have all their representatives. On a slight elevation at the east side stands Damside House, the summer residence of the proprietor, H. Macduff Duncan, Esq. The slope to the south and west of the mansion is laid out in grass and planted with shrubs and ornamental trees. On the edge of this shrubbery among the grass the *Luzula* was found. I noticed only one plant with two flowering stems. From the situation and the fact that there was only one plant, it may very well be a "garden escape," or an introduction from abroad. Perhaps those of your readers who may have gathered the plant will give a description of the localities in the pages of SCIENCE-GOSSIP, in order to have it determined whether the plant has any claim to be regarded as a native or not. A friend is anxious to know if the plant has been discovered in Forfarshire. Could any of your readers give the information and the localities? Another uncommon plant which I found in the same wood was what I take to be *Doronicum pardalianches* (Leopard's-bane). Lest I should be mistaken, I enclose a specimen for identification.—*William Martin, Aberuthven.*

COLOURS OF FLOWERS.—Below is a table, which I have compiled, of the colours of some British wild flowers, having reference to the months in which they open. Number of plants catalogued, 1143.

Colours.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Red	..	..	1	1	4	12	8	..	..	..	..	..	26
Crimson	..	..	..	..	2	2	3	..	..	..	..	..	7
Scarlet	..	..	..	..	..	3	1	..	..	..	..	..	4
Pink	..	..	..	2	6	13	18	2	..	..	..	..	41
Rose	..	..	..	1	7	16	11	3	..	..	..	..	38
Flesh	..	..	..	1	4	6	2	1	..	..	..	..	14
Pink-Red	..	..	..	..	..	..	..	1	..	..	..	..	1
Yellow*	..	2	7	10	21	92	94	18	..	..	..	..	254
Yellow-Black	..	..	..	..	..	1	..	..	..	..	..	..	1
Yellow-Lilac	..	..	..	..	..	1	..	..	..	..	..	..	1
Brown-Green	..	..	..	1	..	1	1	1	..	..	..	..	4
Brown-Purple	..	..	..	..	1	1	..	..	..	..	..	..	2
Yellow-Red	..	..	..	1	2	3	2	2	..	..	..	..	10
Yellow-White	..	..	1	1	4	8	6	2	..	..	..	..	22
Yellow-Green	..	1	1	..	2	5	2	..	..	..	..	..	11
Yellow-Purple (or Blue)	..	..	..	1	1	4	8	1	..	..	..	..	15
Blue	..	..	2	13	16	17	20	3	..	..	..	..	71
Lead	..	..	..	..	1	..	..	..	..	..	..	..	1
Violet	..	..	..	..	2	1	..	..	..	..	..	..	3
Purple	..	..	3	4	18	50	64	24	2	..	..	..	165
Lilac	..	..	..	3	2	3	1	2	..	..	..	..	11
Purple-Flesh	..	..	..	..	..	..	1	..	..	..	..	..	1
Purple-Violet	..	..	1	1	..	..	1	..	..	..	..	..	3
Purple-Green	..	..	1	..	..	2	..	1	..	..	..	..	4
Violet-Blue	..	..	..	1	1	2	..	..	..	..	..	..	4
Lilac-Rose	..	..	..	..	..	1	..	..	..	..	..	..	1
Lilac-Blue	..	..	..	..	..	..	..	1	..	..	..	..	1
Lilac-Purple	..	..	..	1	1	..	..	..	..	..	..	..	2
Purple-Cream	..	..	..	..	1	..	1	..	..	..	..	..	2
Purple-Rose	..	..	..	1	1	3	6	1	..	..	..	..	12
Blue-Red	..	..	..	..	..	3	1	1	..	..	..	..	5
Purple-Black	..	..	..	..	1	1	..	..	..	..	..	..	2
Blue-Purple	..	..	..	2	2	4	2	1	..	..	..	..	11
Black-Green	..	..	..	..	..	1	..	..	..	..	..	..	1
Green-Red	..	..	..	..	1	..	..	..	..	..	..	..	1
Green-White	..	1	..	1	5	3	1	2	..	..	..	..	13
Green-Rose	..	..	..	..	..	..	1	..	..	..	..	..	1
Green	..	..	..	..	3	4	8	..	..	..	..	..	15
White	..	1	5	14	49	63	71	13	1	..	..	..	217
Crimson-White	..	..	..	..	1	1	1	..	..	..	..	..	3
Pink-White	..	..	..	..	2	1	1	1	..	..	..	..	5
Rose-White	..	..	..	..	..	2	3	..	..	..	..	..	5
Blue- (or Purple-) White.	..	..	..	1	6	5	6	..	..	..	..	..	18
Cream	..	..	..	1	1	7	1	1	..	..	..	..	11
Pink-Purple	..	..	..	..	..	2	1	..	..	..	..	..	3
Total	..	5	22	62	168	354	447	82	3	..	..	..	1143

* Including brown, orange, dark yellow, light yellow, sulphur, straw, buff, &c.

—*Alfred Waller.*

LOCAL NAMES OF PLANTS, CO. FERMANAGH.—Cleavers or Goose-grass (*Galium aparine*), "Robin-run-the-Hedge"; Gorse (*Ulex Europæus*), "Whin"; Alder (*Alnus glutinosa*), "Elder"; Elder (*Sambucus nigra*), "Boor-tree"; Dog-rose (*Rosa canina*), "Bucky-briar," and its fruit, "Buckies"; Foxglove (*Digitalis purpurea*), "Fairy-fingers"; Watercress (*Nasturtium officinale*), "Water-grass"; *Anacharis alsinastrum*, "Cats-tails"; Irish or upright Yew (*Taxus Hibernica*), "Palm," probably from its customary use on Palm Sunday by the peasantry; Couch-grass (*Triticum repens*), "Scutch-grass;" Iris, "Flagons"; Hart's-tongue Fern (*Scolopendrium vulgare*), "Fox-tongue"; Earth-nut (*Bunium flexuosum*), "Pig-nut"; Wood-sorrel (*Oxalis acetosella*), "Sheep-sorrel"; Common Sorrel (*Rumex acetosa*), "Cuckoo's-sorrel"; Wild Hyacinth (*Agraphis nutans*), "Blue-rocket"; Pennywort (*Cotyledon umbilicus*), "Penny-grass"; Plantain (*Plantago*), "Ripple-grass"; Reed-mace (*Typha*), "Black-head."—*J. H. H.*

GEOLOGY.

Liverpool Geological Association.—We are pleased to receive a copy of the first annual report of the above Society, which shows it has commenced very successfully, and promises to continue so. The promoters are chiefly members of the Liverpool School of Science. Among the papers read last year, in addition to the President's address, are the following:—"The Giant's Causeway," by A. Quilliam; "The Rise and Progress of Geological Discovery," by O. W. Jeffs; "Climatic Changes," by T. Brennan; "The Lower Carboniferous Deposits of Anglesea," by Isaac E. George, &c.

Geologists' Association.—The Proceedings of the above Society for October (now edited by Professor Blake) contain the following papers: "On a continuous Section of the Oligocene strata from Colwell Bay to Headon Hill," by Professor Blake; "On the Geology of the Vale of Wardour," by W. H. Hudleston (President); "On Coniferæ," by J. S. Gardiner; with notes of the various excursions.

The Polyzoa of the Wenlock Shales, Wenlock Limestone and Shales over the Wenlock Limestone.—This was the subject of a hard-worked paper by Mr. G. R. Vine, an old contributor to the subject in our Journal. The author has received from Mr. Maw about 1½ hundredweight of materials washed out of the Wenlock deposits of Shropshire, representing the contents of from 6–8 tons of unwashed material. From this material he extracted the specimens of plants, Actinozoa, Echinodermata, Crustacea, and Polyzoa, and he gave a tabular synopsis of the species and their distribution, with the addition of types from the Wenlock Limestone and of the species of Brachiopoda referred to in a paper by Messrs. Maw and Davidson in the "Geological Magazine" for 1881. With regard to the Polyzoa the author remarked that below the Cretaceous series the two great divisions of Chilostomata and Cyclostomata do not hold good, and suggested that the classification of Palæozoic Polyzoa should be based on the arrangement and character of the cells in combination with habit. The forms characterised in the present paper were:—*Stomatopara dissimilis*, Vine, and vars. *elongata* and *compressa*, *Ascodictyon stellatum*, Nich. and Eth., *A. radiciforme* sp. n., *A. filiforme*, sp. n.?, *Spiropora regularis*, sp. n., *S. intermedia*, Vine, *Diastopora consimilis*, Lonsd., *Ceriopora*, Goldf., *Hornera crassa*, Lonsd., *H.? delicatula*, sp. n., *Polypora? problematica*, sp. n., *Fenestella prisca*, Lonsd., *Glauconome disticha*, Goldf., *Ptilodictya lanceolata*, Lonsd., *P. Lonsdalei* sp. n. (= *P. lanceolata*, auct.), *P. scalpellum*, Lonsd., *P. interporosa*, Vine, and *P. minuta*, Vine.

The Zones of the Blackdown Beds and their Correlation with those at Haldon, with a list of the Fossils.—This was the title of a paper read before the Geological Society by the Rev. W. Downes, B.A. F.G.S., an old contributor to "Science Gossip." The author, after some remarks on the inexact way in which fossils had been collected from or referred to the Blackdown beds, and a sketch of the literature of the subject, passed on to a correlation of the Blackdown beds with deposits in other localities. He pointed out that they do not contain a sufficient number of species in common with the Marne de Bracquegnies to justify an identification with this. He compared them with the Haldon beds, and by a comparison of the fossils bed by bed, showed that of 196 Blackdown species (omitting a few corals) 50 occur at Haldon; the latter section, however, represents not the whole, but only the upper part of the former, nine beds in the lower part of it being without representatives at Haldon. Here also the higher beds contain a thin band, distinguished by a distinct and all but unique fauna (the zone containing the corals described by Professor Duncan). Comparing the Blackdown beds with lists of Cretaceous fossils from other localities, it would appear that we have neither exclusively Upper-Greensand forms at the top, nor exclusively Lower-Greensand forms at the bottom, nor exclusively Gault forms in the middle.

The Rocks of the Channel Islands.—At a recent meeting of the Cambridge Philosophical Society, Professor Liveing read a paper on the above subject. The author described the island of Serk as consisting of a table-land composed mainly of hornblende-schist, intersected by many volcanic dykes which, by the action of the sea and weather, have produced deep ravines and curious caverns. Besides the dykes there are some large veins, filled up chiefly by débris from the sides, of which one, from the facility it has afforded for disintegration, has produced the Coupée and another the Havre Gosselin. The stratification dips away from a point near the Port du Moulin; and above the hornblende-schist lies at both the N. and S. extremities of the island and at the W.

extremity of the neighbouring island of Breeqhou a syenitic rock which the author considered to be a metamorphic stratified rock. The form of Jersey he showed to be due to granitic rocks, which on the N., S. and W. have resisted the action of the sea, while the waves have scooped St. Ouen's, St. Brelade's, St. Aubin's and Grouville bays out of much softer volcanic ashes which form the mass of the interior of the island. On the N.W., Rozel consists of a conglomerate of rolled pebbles connected with volcanic ashes which has well resisted disintegration. He traced the varying degrees of crystalline character to be found in the volcanic ashes, and argued that it was due to a slow process of crystallisation going on in the solid mass, but most marked and carried to the farthest point, where the rock was most easily permeable by steam and gases. He described granitic veins in a felsite rock at Cotil Point, which have the appearance of having been injected in a state of fusion from the neighbouring mass of granite; but other evidence showed the granite to be older than the felsite, so that the author concluded these veins to have been filled by materials derived from the granite, not in fusion, but by a process analogous to that by which ordinary quartz veins are filled."—*J. W. Carr.*

OBITUARY.—Death has been busy among Geologists. Mr. Edward W. Binney, F.R.S., F.G.S., died at the close of the year. No man worked so much for Lancashire geology, or did so much to bring in young recruits and help them as he. We received our first field lessons from him, more than twenty years ago. Peace to his ashes! It will be a long time before his name can possibly drop out of English geology. Mr. Charles Moore, F.G.S., of Bath, has also "joined the majority." An indefatigable worker, a gentle-natured man, labouring for years under ill-health enough to have soured many a man, nevertheless he bore it manfully and patiently, and generously gave both his knowledge and his fossils to the service of the public.

NOTES AND QUERIES.

A VISIT TO A WELSH STONE QUARRY.—The November number of SCIENCE-GOSSIP 1881, has a very interesting paper on this subject, by E. Halse, A.R.S.M. He has come to conclusions as to the condition of the rocks, which he calls making, "our strata tell their own tale." With all deference to this history it is just possible that there may be a different story. In offering it to the pages of SCIENCE-GOSSIP I lay down no dogma, I do not say that Mr. Halse is wrong, but my conclusions are drawn from nature, not from books. In his conclusion the beds are considered as water deposits, as such we must treat them. In conclusion 2nd he writes, "after consolidation they were tilted up."—I read this page in another way. The beds, having been deposited by water, were once in the condition of mud,—they are now hard as the water left them; they necessarily contracted. This contraction produced the effects described. There was no occasion for tilting up, and no force for it. 3rd. "Heated water from certain depths below the surface of the earth containing silica in solution filled up these veins." There was no occasion for hot water; silica is held in cold solution; quartz veins are formed by percolation from above, not from below. The "crystals of iron pyrites" were formed by the filtering process of metallic matter, the whole iron and silica, were in one solution, but were deposited by their varied densities. 4th, "The rocks were next subjected to tremendous lateral pressure, producing undeveloped cleavage." As in No. 1, there was no occasion for pressure; the contraction by drying gave the character described. It is asked, "What is the meaning of the want of parallelism of these plains of cleavage?" This subject was fully explained in "The Biography of Dust," chap. xiv. Mr. Halse tells us it is the result of great mechanical pressure on the strata." We are not told how this force came, and no one of this pressure school has explained it; there is however a reading of this page of nature that seems to explain the case. Cleavage takes place along the line of grain, exactly as wood splits along its line of fibre. The rock in question was deposited by water; when this is still, the grain of deposit is vertical, cleavage is the same. The grain of deposit varies with the water force, and the lines of cleavage do the same. Mr. Halse allows a change of density in the rock; if the water force is the same then the heavy matter subsides in one line, and the light at another; as quartz ran through both formations, it followed the line of grain in each, and necessarily lost its parallel. Under either of these natural and certain actions the effect is produced without more pressure than that caused by the gravity of the material. In reference to the conclusions formed on fig. 143, it is often found that joints by silica are more adhesive than the rock itself. If these remarks can be of any use in getting at the truth, they will be as valuable to Mr. Halse as to any other of your readers who think of these things.—*H. P. Malet.*

FOLKLORE.—In my note in your last number with reference to the names applied to the commoner species of Orchis in the Western Lowlands of Scotland the words "Balderry" and "Balderries," appear (by mistake of the printer) as "Baldberry" and "Baldberries."—*R. T.*

COLLECTING OTOLITES.—I am collecting Otolites, and should be obliged to any one who would answer the following queries. I see by books that I ought to find three bones on each side, but I have as yet never succeeded in finding more than one in any fish operated on. I know that in the human ear there are three, the malleus, incus and stapes; are these three supposed to exist in fishes cemented into one, or are two to be found in a cartilaginous state, and only one ossified; and if so, which is the ossified one, and how can I find the other two? What I do find is one bone enveloped in a gelatinous mass, lying in direct contact with the base of the brain. I have operated on the heads after more or less boiling; perhaps there is a method of treating them which will allow of more structure being made out, if so, I should like to know how; I can find nothing like an auditory canal, membrane, &c. I also find it difficult to identify any except the most common fish; is there any list of synonyms as regards fish names? The fishmongers give names which I cannot find in books; for instance, some time ago I purchased a fish called by the seller a gorball; I have not yet found its proper name. It was an eel-like animal, 22 inches long, weight 28 ounces, dorsal fin commencing just in front of the tail, where it was an inch high, gradually diminishing till it ended close behind the head, lower fin from tail to vent, two pairs of fins (pectorals) near the head, no others, snout pointed, teeth long and sharp, back various shades of brown, blotched with a lighter lemon-colour, sides dusky, belly white, a pointed appendage below the mouth an inch and a quarter in length; caught at Scarbro'. The other day, I bought some witches, said to be a deep-sea fish, caught in large numbers on the northern coast, but which I cannot identify with any common fish. On referring to some notes on flat fish taken from Yarrel's work, I find it most nearly agrees with the Craig Fleuk, but this is stated to be rare. My fish were sole-shaped, but much lighter in colour, being of an almost uniform light brown, inclined to pink, that is when I purchased them; they must have been out of the water one day, perhaps two; lateral line rough, and I think, straight, the slight apparent curvature was caused, I believe, by the cut made to extract the viscera. The layer weighed a pound and a half, was fifteen inches from snout to tail, and five and a half broad between the fins, or eight inches including the breadth of fins. The ear-bones were large in comparison to the size of the fish, and could be seen through the thin walls of the skull, covering the greater portions of the brain; their shape was unusual, discoid, resembling one of the Scarbro' "Thumb-flints."—*W. A. G. Tuxford.*

EARTHWORMS.—Your correspondent, W. Budden, Esq., may help me perhaps to solve two questions that occurred to me while reading Darwin's latest book. 1. In what position were the paper-triangles placed with reference to the worms?—for surely this would influence them as to where they should lay hold of them. 2. What would happen were paper footstalks to be put on the triangles?—*A. M.*

EARLY NESTING.—A blackbird's nest containing three newly laid eggs, was found in a garden at Edgbaston, about the middle of November. The weather has been very mild here.—*Geo. F. Wheeldon.*

NAMES OF FLOWERS.—In my grandmother's garden, many years ago, grew a flower, which she always called a "Loveanidle." As I grew older, I found it was more commonly called "Heart's-ease;" and on asking my father, who was a great reader of Shakespeare, the meaning of the older names, he referred me to Oberon, and bid me notice that some of the flowers were purple, while others retained their original "milk-white" colour. Will any one, in return for this information, tell me why, in Dorset, *Orchis mascula* is called "Soldier's Jackets"? If your anonymous correspondent will send me an address, I may get him some white heather next autumn, it is not uncommon about here.—*Julia Colson.*

HEATHER.—Last year I found a small quantity of white heather at Caradale on the East Coast of Cantire, N.B., at about sea-level, and in July last, a tuft, about a foot in diameter on the moors above Redmires (1300 feet above sea-level), about six miles west of Sheffield: although I have spent much time on these moors I have never before seen any white heather on them, and thought that the colour of that which I found was due to accident, and that it was not a separate variety from the purple; this opinion was strengthened by my finding, about the same time, a root of white hair-bells. I am told that a little white heather was gathered at Port Erin, Isle of Man, last year.—*Thomas Winder, Sheffield.*

HEATHER.—I see in SCIENCE-GOSSIP of this month that a correspondent wishes to know whether the white variety of heather is uncommon. In reply I beg to say that I noticed it very frequently while shooting this year in Perthshire, both of the common heather, and of both varieties of "bell" heather. I notice also that the foliage of the white varieties is of a lighter brighter green than that of the usual colour. I have myself never seen the white varieties except in Scotland.—*C. S. G.*

WHITE HEATHER.—Seeing in December's number of SCIENCE-GOSSIP a query regarding white heather, I send the following for the information of the inquirer and others whom it may interest. Last year, and the year previous, when grouse shooting on the Lammermuirs in Haddingtonshire, I frequently came across patches or stray plants of the white heather, in fact I hardly remember shooting a single day without seeing some of it. It had a small flower, smaller than that of the purple heather amongst which it was growing. The patches were invariably small, generally about a foot in diameter, though more often it was found growing as a single plant with one or two flowering shoots.—*A. P. L.*

SHORE LARK.—I have a young cock shore lark (*Alauda alpestris*) caught with some skylarks at the end of October, 1881, near Stamford Hill, Clapton, which I have now in my possession in perfect health and coming very nicely on song.—*L. W. Hadler.*

PARROTS AND THEIR FOOD.—If the friend of your correspondent W. E. B. in the December number of SCIENCE-GOSSIP is in the habit of giving the parrot animal food, that will account for the bird plucking out its head and back feathers. I have had an Australian grey parrot for about fifteen years, which is always in perfect plumage, unless when moulting. His food consists chiefly of canary seed, a spray of millet seed and a hard crust of bread or a biscuit. When in moult a little maw seed. His green food consists of chickweed, and when in seed he is very fond of it. Clean water is always at his command, of which he drinks sparingly about twice a day. Animal food he has never had offered to him. A friend of mine has an Australian parrot, and about two years ago "Polly" plucked out all its feathers it could reach. I was asked for a reason; my answer was, do not give him any meat, knowing as I did the bird was given bones to pick. This not being by my friend considered a satisfactory solution of her inquiries, I was asked to consult a naturalist, which I did; and received the same advice as that offered by me. This piece of advice was carefully attended to, and resulted in "Polly" regaining its natural plumage in a short time, and I believe still retains it.—*J. H. M.*

DO PARROTS REQUIRE WATER?—Some years since I had one of the small Australian parrots (*Melopsittacus undulatus*) which was very tame and a pet. I never saw it drink; after a while I ceased to give it water, and I know that during four or six months (I forget which) it had none in its cage. The food it had was the ordinary dry bird-seeds, and the room it was in was very dry from the daily use of fire and gas. After that time although water was kept in the cage I never saw it drink, and very seldom wash itself. During the time it was thus treated, the bird was active and lively, and continued so for about two years afterwards, almost to the day of its death. As parts of Australia are subject to such long and excessive droughts, this appears to be another illustration of the wonderful adaptation of animals to the conditions under which they live. It is worthy of remark that in Gould's "Birds of Australia," Captain Shaw states that the nature of its food (grass seeds), and the excessive heat of the plains compel it frequently to seek the water and drink.—*G. A. Rowell.*

PARROTS AND WATER.—We have a lovely grey African parrot, have had it many years, and it has never had any water except what it catches when we give it a shower bath of tepid water in summer time. We always keep it with a supply of boiled milk and bread in one cup, and nut kernels and small white stones in the other. It is always in perfect health, and never seems to have lost a feather in moulting. It is very fond, too, of biscuits, and a bone to pick pleases it. When my husband takes it out of the cage to have a game with it, Poll gulps up its food and wants to feed its master, and, on his refusing to take it into his mouth, Poll will sometimes climb up and fill his ear with food.—*Bessie Thomas.*

SPARROWS.—In several distinct parts of Kent, also in the neighbourhood of Wellington, Salop, sparrows have been seen with white feathers in their wings; some have only two or three of them on the top of the wing, others have a perfect bar of them and look quite bright and pretty. Can any of the readers of SCIENCE-GOSSIP tell me if they have seen anything of the kind, and in what localities?—*Clara Kingsford, Canterbury.*

VIOLETS IN JANUARY.—I read in your SCIENCE-GOSSIP for this January of violets being gathered near Bath on December 1st and jasmines in bloom in November. Here in "Wild Wales" we have been able to gather from our garden (by no means a sheltered one) sweet violets almost daily, and the southern front of our house is now gay with the yellow blossoms of the jasmine's rich flowers, and has been so for many weeks. I send you a few, asking your kind acceptance.—*Bessie Thomas.*

PARASITES ON DYTICUS MARGINALIS.—I recently had a male specimen of the great water-beetle, *Dyticus marginalis*, die without any visible cause, but upon examining it, I found adhering to the upper side of the body, beneath the wings, three parasites. Two of these were about three lines long by one line broad, and consisted of a bag tapered at the ends, the neck, or portion affixed to the body of the beetle, being somewhat constricted, and bent half round. The third parasite was smaller than the other two, but they were all of a bright orange-red colour, similar to the hue of a ripe capsicum, of which (on a smaller scale) they reminded me. They were firmly attached to the beetle. Perhaps some of your correspondents will give the name of these creatures. It is a well-known fact that males of *D. marginalis* die sooner, at least when in captivity, than the females. Is it possible they are more subject to the attacks of this parasite?—*Abbott G. Laker.*

MASON WASPS.—A friend in New Zealand has sent me some spiders for microscopical purposes, taken from the nests of the mason wasp. He wishes to know if there are any mason wasps in England, and how many species: any information on the subject will greatly oblige—*F. W. S.*

MOUNTING SHELLS.—Will some one kindly inform me the best and cheapest way of mounting a small collection of beautiful foreign shells (large and small) in a cabinet? and oblige—*One New to Science.*

"SOME SAY THE LOATHÈD TOAD AND LARK CHANGE EYES."—See Glossary, p. 242, Bickers and Sons, 1880 edition of Dyce's "Shakespeare." Dyce quotes Warburton: "The toad having very fine eyes and the lark very ugly ones, was the occasion of a common saying among the people that the toad and the lark had changed eyes."—*L. C. Robertson.*

HAREBELL.—The enclosed extract from Latham's "Johnson's Dictionary" appears to afford a satisfactory explanation of the name, and the passage from Scott, referred to by Mrs. Watney, seems to support this view.—*R. Egerton.*

"HEATHER-BELL."—In Scotch, this is a common word. In the ordinary English, however, it prevails in the abbreviated and catachrestic form "harebell." This has nothing to do with hares, but is simply "ha'erbell" with the elision of the *th* or *d* (heder and hedder being other forms) between the two vowels, a process which in the Danish language is almost universal; sadel, fader, &c., being pronounced sa'el, fa'er, &c. The derivation of the word being ascertained, the doubt as to its true application is removed. Two well-known plants are called harebells. To go no farther than the last edition of Sowerby's "British Wildflowers," we find the following entries:—1. *C. rotundifolia*, bluebell, hairbell. 2. *H. non-scriptus*, wild hyacinth, harebell. It is to the former of these plants that the name most properly applies (the distinction between the "hair" and "hare" being either imaginary or artificial) in respect to its resemblance to a bell (for it belongs to the genus Campanula, or bellflower) and its growth upon the heath."—From Latham's "Johnson's Dictionary," edition 1866, under "Heather-bell."

ORIGIN OF THE WORD HAREBELL.—I venture to point out that the true etymology of the word has not yet been given by any of your readers. Dr. Brewer, in his very excellent "Dictionary of Phrase and Fable," explains the words thus: "Hare-bell, a corruption of *ayr-bell*, from the Welsh *awyr-pel*, a balloon or distended globe." I cannot find the compound word *awyr-pel* in Dr. Pughe's "Dictionary of the Welsh language," but the literal translation of the word is *air-ball*, the word *pel*, in certain Welsh sentences, becomes *bel*, hence the word has been corrupted into hare- or hair-bell. In Latham's "Johnson" the proper spelling is given as ha'er-bell, an abbreviation of heather-bell, but this explanation is surely rather far-fetched.—*E. Halse.*

THE ARBUTUS.—With reference to Mr. Rasor's interesting notes, I may say that the arbutus grows freely about here, Kingstown, co. Dublin, in shrubberies and gardens, and bears fruit plentifully. To-day, January 2nd, my table is decorated with both its flowers and fruit, for owing to the extreme mildness of a portion of this season, some of its shrubs are bearing both unusually large fruit and a few flowers.—*James Bowker, F.R.G.S.I.*

NOTES ON THE ARBUTUS.—This shrub is to be observed to great advantage in a rocky gorge in Blaise Castle woods, near this city. The fruit ripens here at least, and I can quite endorse Mr. Rasor's opinion as to its flavour; moreover the pheasants seem to have similar views of its excellence, and may be observed feeding on the fallen fruit beneath the trees.—*J. W. Cundall, Bristol.*

DREISSENA POLYMORPHA.—It may interest "E. Gardner" to know that this mollusc, first, I believe, noticed as British by Mr. Sowerby in 1824, appears to be by this time quite acclimatised. In 1834 they are stated to have been observed at Edinburgh, and are now common almost throughout our freshwater system. In the canals at Bath and Gloucester they are especially numerous, and are also common in the docks here, in the river Avon, &c.—*W. J. Cundall, Bristol.*

MILDNESS OF THE SEASON.—I may say, as a rider to Mr. Moffat's and Mr. Williams's notes, that we had in November the warmth we should have been thankful for in the autumn. Many garden flowers have bloomed here, Kingstown, until a fortnight ago a few nights' frost killed them, and on December 31st at an evening service in the Mariners' Church a large white butterfly was flitting about.—*James Bowker, F.R.G.S.I.*

HEN CANARY.—I have a hen canary singing as lustily as many cock birds. Being always under the impression that the female was mute, is the one in question a kind of phenomenon?—*Stuart McB.*

MR. KITTON'S ILLUMINATION.—Before trying the above mode of illumination I had been in the habit of condensing the light on to the mirror by means of a bull's-eye condenser, convex side uppermost; this I found answered pretty well, and I also use two ordinary lenses fitted into a brass tube of about one inch in length, which I fit in the diaphragm under the stage to condense the light on to the object. I do wish people in giving instructions for what is meant to be for the guidance of others would not follow the appetising cookery books, which give you the fullest particulars what to do with the necessary article, but not a word or syllable how or where you can obtain that same. Ultimately I obtained a Bohemian glass receiver from a chemical shop and a funnel holder. Now, my lamp is a Queen's reading-lamp, burning colza oil, it moves up and down a brass rod; so I place the flame fifteen inches from the table and I fix the receiver in the funnel stand, the bottom about eight inches from the table. The lamp stands fifteen inches or more from the mirror, and I then place the receiver about four to six inches from the lamp and focus on to the mirror. I would strongly advise others, to prevent disappointment (which was my first result), to do as I had ultimately to do, viz. 1st, use *distilled filtered water*. 2nd, fill the globe quite full, so as to prevent a shaky light. 3rd, do not use too much sulphur chlorate, and first filter same. I am sure others will then join me in thanking Mr. Kitton for his valuable suggestion, for it yields the nicest, softest light I have ever worked by—giving, with the aid of a spot lens, a character to diatoms I never before witnessed, except with other people's microscopes. It answers splendidly with the Polariscope, and in all cases when needed gives a jet black ground.—*John Alex. Ollard.*

DISEASES OF BLUE-BOTTLE FLIES, &c.—The other day I noticed a bluebottle having some difficulty in crawling along the floor and unable to fly. Killing and examining it under the microscope I found the tongue and ovipositor dried up and hard, the contents of the thorax half dry, and as to the abdomen, it was closely packed with larvæ lying side by side with the heads towards the thorax, all the viscera gone, and nothing left but the alimentary canal, two fragments of tracheæ and a few of what seemed to be the skins of eggs. I send a few specimens of the larvæ, and should feel obliged by knowing what they are. For three seasons I had turned a large bay window into a breeding ground for spiders, and was fortunate enough to witness a set fight, and what I do not doubt for a moment was the act of pairing.—*H. Maceo.*

WHITE ORCHIS.—I see one of your correspondents is surprised to hear that a specimen of *O. morio* has been found white; in my locality it is oftener white than purple, the green veins of the wings showing boldly up.—*G. T.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

J. A. O.—The remarks made concerning Rimmer's "Land and Freshwater Shells" are incorrect. We regard it as the best popular book of its kind which has yet appeared, and the author (we believe) had the kind supervision of Dr. Gwyn Jeffreys in bringing it out.

B. THOMAS.—Many thanks for the violets and jasmine. The former reached us still full of perfume.

C. R.—Both your papers are now to hand, and will appear in due course.

N. P.—The *Jasminum nudiflorum* is no doubt the flower mentioned.

T. P. D.—Your list of local plant names and your plant-lore would be very acceptable.

S. H.—You will find the following books among the kind of books you require: "Contributions to the Theory of Natural Selection, &c.," by Alfred Russel Wallace; Waterton's "Essays in Natural History:" "Leaves from a Naturalist's Note-Book," by Dr. Andrew Wilson; "Nature's Bypaths," by J. E. Taylor; "Rambles of a Naturalist," by Robert Garner.

A. WALLER.—There is no dearth of really good manuals of geology. First of all we have the "Student's Manual" of Sir C. Lyell; then the following: Juke's and Brown's "Manual;" Professor Geikie's ditto; Penning's "Field Geology;" Woodward's "Geology of England and Wales;" Professor Green's "Physical Geology," &c.

P. B. W.—Dr. Lang's work on "European Butterflies," now being issued in 3*s.* 6*d.* parts, is by far superior to the other serial work you mention in artistic merit, although it is deficient in not giving the caterpillar and chrysalis.

H. R. ALEXANDER.—Dr. Cooke's "Plain and Easy Account of British Fungi," would enable you to name most of your specimens. Stark's "History of British Mosses," published at 10*s.* 6*d.* (coloured plates), would be an effective help; "British Hepaticæ," by Dr. Cooke, is a fourpenny attempt at popular science tried many years ago. It is an excellent thing, but we are not aware if any copies remain. Any bookseller will tell you the published prices of the books you name. Many of them may be obtained second-hand of W. Wesley, Essex Street, Strand, or W. Collins, 157 Portland Street, W.

ELLEN P.—Your fossils are all from the upper cretaceous bed, and are as follows: 1. *Ananchytes ovata* (commonly called "Fairy loaves"); 2. *Micraster cor-anguinum*; 3. *Terebratula carnea*; 4. a species of *Parasmilia*, probably *centralis* (a fossil coral).

R. HARDEN.—Your specimen is not a sea-weed, but a polyzoon (a colony of molluscoid animals), called *Flustra chartacea*. See Taylor's "Half Hours at the Sea Side."

T. H. BAFFHAM.—The two specimens of Australian algæ have been submitted to specialists to name, and returned to us with the remark "Unable to tell the names for want of proper specimens."

"OMPHA."—We have no doubt you could obtain a specimen of *Utricularia* by offering something in exchange in our column devoted to that purpose, and which we open free to all our readers.

J. T.—Carefully read the chapter devoted to the subject in "Notes on Collecting and Preserving Natural History Specimens," price 3*s.* 6*d.*, published by David Bogue.

F. A. BARTON.—Mr. Mechan's paper on "Objects of Sex and Odour in Flowers" is not on sale. It was published, we believe, in the "Transactions" of one of the American learned societies.

OLD SUBSCRIBER.—You will see by the reference you quote to Pritchard's "Infusoria" in 1877, that we replied we were not aware of any new edition being prepared. None has appeared, nor is it likely there will be, now that Saville Kent's magnificent monograph on the infusoria is completed.

NOVOCASTRIAN.—Your query concerning the "round worms" in the dog, &c., is not quite definite. The common roundworm (parasitic) is *Ascaris lumbricoides*, it belongs to the order Nematoda. The "Midland Naturalist" contains much microscopical information.

C. S. Gordon.—The work on European lepidoptera, now being published by Messrs. Cassell in sevenpenny monthly parts, gives coloured illustrations of both caterpillars and chrysalides.

Eels.—Can any of your correspondents tell me where and how eels breed? Are they viviparous?—M. N. N. G. C.

EXCHANGES.

Wanted, Cassell's "New Natural History," will exchange. Vols. I. II. III. (bound), and IV. (in numbers), of "Science for All," for exchange, books or slides.—W. Ernest Milner, 47 Park Road, Haverstock Hill, N.W.

Wanted, everyone interested in microscopical science to send address to Microscopist, 95 Burbury Street, Birmingham.

For slides of *Solanum auriculatum*, fine stellate hairs, from Mauritius. Send lists.—Rev. A. C. Smith, St. John's Vicarage, Crowborough, near Tunbridge Wells.

Will exchange eleven of Jules Verne's shilling novels, published by Low, and illustrated, in very fair condition, for fossils either from the Norwich, red or coralline crags.—F. H. Parrott, Walton House, Aylesbury, Bucks.

For a piece of *Hyalonema mirabilis*, including glassy threads, send good and rare diatomaceous material.—J. Tempere, Storrington, Sussex.

Wanted, copies of the "London University Calendar" for 1879 and 1880.—F. W. Oliver, Kew, Surrey.

Ten volumes of Science-Gossip, 1871 to 1881, inclusive, complete and in good order; exchange for microscopical apparatus.—T. S., 16 King Street, Reading.

Wanted, *Gymnostomum rostellatum*, *Weissia crispula*, *Archidium phascoides*, and the species of *Amblystegium* except *A. serpens*.—Miss Ridley, Hollington, Newbury.

Large mahogany cabinet of fifty-six drawers, lettered and numbered in brass, with ebony handles, suitable for either microscopical, geological, or other specimens, could be adapted with trays to hold 11,000 of the former, 3″ × 11″. Would exchange for either first-class lantern with microscope attached, or binocular microscope.—T. S., 16 King Street, Reading.

What offers for twelve volumes of "Chambers's Repository"? all well bound and in good order.—Edmund Tye, High Street, Stony Stratford, Bucks.

A few more specimens of *Pellæa andromedæfolia*, *P. Ornithopus*, *Gymnogramme triangularis*, *Adiantum*, var. *Capillus-Veneris*, from the Santa Cruz Mountains, in exchange for British ferns, mosses or shells.—J. Edward Reed, Wright's Station, Santa Clara Co., California, U.S.A.

I am making a collection of zoophytes and polyzoa, and shall be glad to make exchanges. Numerous foreign zoophytes for exchange. Lists exchanged.—W. H. C., 5 Birch Grove, Rusholme, Manchester.

Wanted, Parts 1 to 16 inclusive, Vol. I. of "Quarterly Journal of Conchology," also Parts 109, 110 and 116 of Science-Gossip. Offers requested.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

Wanted, Science-Gossip for 1877 and 1878, clean and unbound. Exchange.—E. D. Marquand, Hea, Penzance.

"London Catalogue," 7th ed., Nos. 5, 180, 184, 237, 241, 313, 317, 518, 698, 735, 769, 906, 907, 1337, 1486, 1507, 1566, and other East Anglian plants for exchange.—William Jordan, Cockfield, Sudbury, Suffolk.

Wanted, a good mahogany cabinet with glass frame, suitable for insects and moths. I will give in exchange my collection of curiosities from here, such as arms, &c., and shells, crustacea, fossils and minerals. Will send mine first if preferred.—Frank W. Newton, Mossamedes, Angola, West Coast of Africa.

Having collected shells indiscriminately for about three years, but having now decided to collect British, marine, land and freshwater species only, I shall be glad to exchange foreign for British species, and will furnish full particulars on application.—Herbert Ellis, Hill House, Epsom, Surrey.

For exchange, Science-Gossip, unbound, in good condition, for the years 1877, 1878, 1879, 1880, and 1881; what offers? Works on science or art preferred.—J. McKenzie, Nursery Cottage, Birkby, Huddersfield.

Four volumes of Hardwicke's Science-Gossip, 1878 to 1881; would exchange for side-blown British birds' eggs.—F. J. Rasell, 30 Argyle Street, St. James' End, Northampton.

For *Puccinia umbilici* send stamped and directed envelope to E. C. J., 3 Florence Villas, Ilfracombe.

For really good microscope, I offer scientific exchange—value of £10 or more, viz., handsome mahogany micro-cabinet, collection of British mollusca, books, etc.—E. Wilson, 18 Low Pavement, Nottingham.

Slides of *Eccremocarpus scaber* (in balsam), and others, in exchange for other well-mounted slides.—T., Decoy Farm, Crowland, Lincolnshire.

"L. C.," 7th ed.: 164, 274, 497, 739, 809, 844, 852, 854, 923, 1012*b*, 1151, 1287, 1288, 1301, 1416, and others, for other rare plants. Send lists.—F. C. King, 1 Tulketh Crescent, Ashton, Preston, Lancashire.

Will exchange flint implements for coins or natural history works.—G. J. Aerks, Close, Salisbury.

Wanted, English silver and copper coins, tokens, medals, naval and military war medals, &c., in exchange for fossils and natural objects.—F. Stanley, 6 Clifton Gardens, Margate.

Wanted, good pocket Coddington lens, in case. Can offer good exchange in slides.—J. E. Fawcett, Rawdon, near Leeds.

Wanted, "Micrographic Dictionary" and other natural science books, recent editions. Good slides, material and books in exchange. Send for lists.—J. C. Blackshaw, Cross Street South, Wolverhampton.

"Geological Rambles round London," and Page's "Geological Examinator." What offers?—Geo. Hall, 5 Rasen Lane, Lincoln.

Wanted, British or foreign correspondents for the interchange of specimens of Algæ, including the Desmideæ. For particulars apply to W. Joshua, F.L.S., Cirencester.

Wanted, named specimens of any common British shells.—Tunley, Albert Road, Southsea.

Well-dried specimens wanted (L. C. 7th ed.) of 146*b*, 161*c*, 171, 309, 368, 574, 579, 613, 720, 933, &c. Offered, 121, 130*b*, 147, 184, 241, 325, 313, 566, 683, 858, 1499, 1519, 1578 and others.—E. F. Linton, Sprowston Vicarage, Norwich.

"L. C.," 7th ed., offered, 12, 16, 17, 18, 52*a*, 131, 133, 160*b*, 232*b*, 398, 502*b*, 725*b*, 812, 1209, 1310, 1388, 1430, 1505, 1516 and many others. Lists exchanged.—Joseph S., Rowse, 25 Ashton Street, Dukinfield.

"L. C.," 7th ed., offered, 10, 14*c*, 15*b*, 18*b*, 41, 49, 161, 236, 406, 1136, 1198, 1285, 1357, 1358, 1412, 1441*b*, 1449, 1507, 1519, 1563, 1577, for other rare plants. Lists exchanged.—H. Searle, Rook Street, Ashton-under-Lyne.

For exchange, 400 or 500 lepidoptera, including good series of *Orion*, *taminata*, *extersaria*, *consortaria*, *W. album*. Common lepidoptera will be accepted. The desiderata being numerous, a visit will be undertaken by advertiser for purpose of exchange, if the greater part be wanted and the distance not very great. A London correspondent preferred.—B. Piffard, Hill House, Hemel Hempsted, Herts.

Wanted "Sharp's Catalogue of British Coleoptera;" could exchange first-rate specimens of British lepidoptera.—E. A. Dixon, 27 Head Street, Colchester.

BOOKS, ETC., RECEIVED.

"Astral Origin of the Emblems and Hebrew Alphabet." By the Rev. J. H. Browne. London: E. Stanford.

"Consumption." By C. W. De Lacy Evans. London: Bailliere, Tindall & Cox.

"Practical Microscopy." By George E. Davis. London: David Bogue.

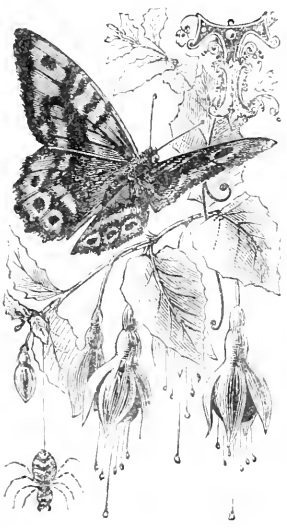
"The Anatomy of the Mouth-parts and of the Sucking Apparatus of some Diptera." By Dr. George Dimmock. Boston, U.S.A.: A. Williams & Co.

"Journal of Applied Science."
"Land and Water."
"The Antiquary."
"Chemist and Druggist."
"Midland Naturalist."
"Northern Microscopist."
"Ben Brierley's Journal."
"Scottish Naturalist."
"The Scientific Roll." No. 5.
"Natural History Notes." Vol. II., No. 1.
"Cosmos: les Mondes."
"Journal de Micrographie." Octobre.
"La Science pour Tous."
"Le Monde de la Science."
"Feuille des Jeunes Naturalistes."
"Canadian Entomologist."
"American Naturalist."
"Boston Journal of Chemistry."
"Good Health."
&c. &c. &c.

Communications received up to 10th ult. from:—J. F. G. D.—C. E. K.—F. K.—T. W.—J. W. C.—W. J. S.—A. P. L.—R. F. T.—W. E. M.—J. J.—C. M. A.—L. W. H.—Dr. W. T. G.—J. A. O.—W. H. W.—C. K.—S. M. B.—F. K.—S. B.—F. W. S.—F. W. O.—T. N.—E. H.—T. P.—H. W. D.—E. A. F.—J. McK.—F. W. N.—E. D. M.—W. B. R.—G. M.—W. J.—R. E.—H. R. A.—J. E.—J. W. C.—J. C. R.—W. W.—M. R.—J. B.—W. H. C.—J. E. R.—E. T.—J. F.—W. R. S.—W. M.—W. J. S.—Dr. C. C. A.—J. P.—Sir R. H. P.—T. R. W.—C.—P. R.—Col. C.—J. S.—F. S.—T. T.—E. W.—B. T.—C. B. M.—E. C. J.—C. R.—T. P. D.—E. H.—F. J. R.—E. P. D.—W. C. H.—E. S.—F. C. K.—J. H. H.—W. T.—W. E. D.—W. B. H.—J. C. F.—J. H. M.—W. W. M.—F. H. P.—A. C. S.—J. T.—J. A. O.—E. F. L.—W. H. T.—W. J.—G. J.—J. S. R.—Dr. J. A O.—G. H.—J. M. M.—H. S.—A. W.—J. E. F.—J. C. B.—F. M. R.—A. W. O.—B. J.—H. A. R.—C. D. W.—E. A. D.—F. M.—J. A. L.—J. R.—W. J. V. V.—W. T. S.—&c.

ON MICROSCOPICAL DRAWING.

By W. T. SUFFOLK, F.R.M.S.



THE article by E. J. D. in the January number of SCIENCE-GOSSIP calls attention to a point much neglected, notwithstanding the pains taken by writers on the microscope to enforce the value of observations being accompanied with drawings.

I entirely agree with E. J. D. as to the extreme beauty of highly-finished microscopical drawings; groups of marine and pond life make admirable pictures, and furnish infinite varieties of beautiful form and colour.

A few additional hints may be acceptable to your readers.

I dispense entirely with the camera-lucida and all instruments of a similar nature, and substitute a grating ruled in squares placed over the diaphragm of the eye-piece. I find it better to have the lines ruled on a double-convex lens of shallow curvature, as the interference with the definition is considerably less than when a glass with plane surfaces is used: with this arrangement I have seen Podura-markings well shown with a $\frac{1}{8}$ objective. When the binocular is required, a lens without ruling, but of similar curves, should be placed in the other eye-piece to equalise the magnifying power in each field. A convenient distance for the lines forming the squares is $\frac{1}{50}$ inch, this gives a field not too much crowded with squares, and on the other hand the divisions are not too large to render the setting out of the outline inexact. The drawing is made on ruled paper, the squares being of a size suitable to the intended size of the design, just as in the well-known draughtsman's process of enlarging and reducing by squares. A drawing of any size, from a small sheet to a large lecture diagram, can be made directly from the microscope.

The process also possesses the additional advantage of requiring no change in the position of the microscope, as is the case with the camera-lucida, and can be used for a long time without any of the strain upon the eye inseparable from the use of instruments, where the image and pencil point are viewed through the divided pupil of the eye.

When measurements are required, the value of the side of one or more squares can be determined with the stage micrometer, and from data so obtained a scale can be constructed on the drawing.

With regard to materials I must take exception to the use of *flake white* for compounding body colours, as in water all pigments made of carbonate of lead rapidly become blackened. Chinese white, a preparation of oxide of zinc, should alone be used for this purpose.

The following list of colours contained in my own box may prove useful:—Aureolin,* Yellow Ochre, Lemon Yellow, Cadmium Yellow, Vermilion, Purple Madder, Raw Sienna, Burnt Sienna, Rose Madder, Light Red, Brown Madder, Cobalt, French Blue, Indigo,† Vandyke Brown, Blue Black, Sepia, Viridian.‡

In addition to the colours in cakes, a few that are likely to be used in large quantities should be obtained in tubes; where thick painting is required, this form of colour is particularly useful.

The Chinese white should be kept in a bottle with a greased stopper; in tubes it soon hardens and becomes unfit for use; it should be worked with the palette-knife and a little water to the consistency required.

Avoid the use of crimson and purple lakes,

* Aureolin, a transparent pure yellow, quite permanent, and an excellent substitute for gamboge, as, being without gloss, it can be employed in skies and distances.

† Indigo is only very slowly acted upon by light, and may be considered permanent in the diffused light of an ordinary room; avoid mixing with Indian red, which speedily destroys it.

‡ A transparent oxide of chromium, perfectly permanent, of great use both by itself and in compounding other greens; the opaque oxide of chromium may also be found useful; both are extremely permanent colours.

carmine and all other cochineal colours; the madders are the only safe substitutes. Iodine, scarlet, the chrome yellows, and all aniline colours, should find no place in the colour box; the list given above will be found sufficient for nearly every purpose.

Very good effects are obtainable by the use of black-lead, and for rapid work it offers many facilities. In addition to pencils of the usual kind, some with broad leads will be found useful for covering larger surfaces. Very delicate tints can be made with black-lead powder rubbed on the paper with a suitable leather stump.* Tints of any depth can also be obtained from blacklead used as a water-colour, it is to be procured in cakes.

Blacklead, charcoal, and chalk drawings can be permanently fixed, by saturating the paper from behind with a varnish composed of bleached shellac and alcohol. This should be very freely applied and dried in a warm room or with caution before a fire. The strength should be such that it will just dry without leaving a gloss on the paper. Winsor and Newton's white lac varnish, mixed with an equal bulk of methylated spirit, will be the right strength. After this treatment a pencil drawing may be placed in the portfolio, and even exposed to some amount of rubbing, without injury. The varnish does no harm to any water-colour tints that may be used in combination with pencil.

SWISS TREES.

By Edward John Titt, M.D.

FIR woods are the natural drapery of mountain regions, and the eye never tires of admiring the various ways in which they relieve the monotony of mountains. Sometimes firwoods completely clothe their lower ranges, or else adorn them by various shaped patches of dark green, and they never tire of fringing them with a more or less deeply serrated edge-line. Dr. de Crespigny is right in saying that the *Abies excelsa* is the prevailing tree, but what the landlord of the *Tête Noire* Hotel told me of his woods, often applies to other points. According to him, the forest was made up of "*sapin blanc*, *sapin rouge* and *mélèze*," which is Larch.

These immense forests belong either to private individuals, to the commune, or to the Canton. The cutting down of these woods is controlled by the Government Inspector of Forests. He does not allow them to be cut when they grow on too perpendicular a mountain-side, or when the cutting of them would damage a village, and a commune must have his permission to cut down its woods; whereas, in Italy, it can do so without anybody's permission.

Foreigners have not our love for trees, they cut them all down without leaving a few choice specimens, and those who go to Switzerland find no fir-wood, within an easy walk of their hotel, better than those on Bagshot heath. Four or five thousand feet above sea level there are still fine fir-trees. I found many seven, nine, and eleven feet in circumference at the *Tête Noire* at Rosenlaui; and in a grand forest, on the way from that enchanting spot to the Great Scheideck, I passed a saw mill, where they were sawing trees three feet in diameter, and the flooring of the new hotels is often made with planks two feet wide. An idea of the grandeur of Swiss subalpine forests, in olden time, may be formed by looking after the stumps of old fir-trees in the fir forests.

These stumps of veterans, cut off at about three feet from the ground, have become most interesting studies for the botanist and for the painter. They are of all sizes; one at Rosenlaui measured twenty-seven feet in circumference, and they have been stumps for so long that their whole substance has decayed, and one can run a walking-stick into and through them. The softness is seldom owing to touchwood, often to dry rot. Many of them retain the sharpness of their original line of section, although clothed with ferns and lichens. In the middle of August some were clothed with the saffron-coloured fingers of the *Cladonia furfuracea*, and were gaily decked with the brick-red parts of the *Cladonia purpuracea*. Many of these huge stumps had subsided into heaps covered with ferns and alpine wild flowers, and from ancestral mould there often grows up a promising young fir-tree.

On knocking to pieces these stumps, I have sometimes found a bit of very hard wood, about eight inches long, curved and shaped like the horn of a cow. Its point was always directed towards the centre of the tree, its outer extremity was still circled by rings of woody fibre, and looked as if a branch had been broken off from it. I do not know whether these bodies have been described, but we were all familiar with sections of them as knots in deal boards.

On descending from the Col de la Forclaz, the road to Martigny skirts an extensive forest of old larches. They clothe the mountain to the left of the road, far as the eye can see; many of them must be from twelve to twenty feet in circumference, and they were hearty, though their roots were buried deep under the broken stones that fell from above. At Rosenlaui, the people seem fond of the sycamore; one was fourteen feet in circumference; and some had been planted in the open, and were protected from the cattle.

As we descend to the valleys of Switzerland, we find the beech and Spanish chestnut. I have seen beech woods, but never a fine beech; the old trees had been ruthlessly cut down long ago. The Spanish chestnut loves the sunny slopes of Alpine valleys and the hill-tops. I do not know a prettier sight than Spanish chestnut woods interspersed with huge fantastic boulders, covered with green and golden moss; but the trees are not so fine in the Rhone valley as

* The late J. D. Harding used flat blacklead crayons, and also a stamp of a peculiar form, resembling a plasterer's trowel.

in the hills around Glyon. The walnut tree does well in Swiss lowlands; the largest I have seen are in the public walk at Interlaken, and there was lately one at Bex that three men could just encircle with outstretched arms. A poplar, nine feet in circumference, stands sentinel over the high perched church of Cloet, and the largest of four enormous poplars, in the Ile de Rousseau at Geneva, measures fifteen feet in circumference. I have never seen so fine a row of plane-trees as at Annecy, nor larger pollard plane-trees than at Geneva. One of those in the Place Bellaire is nearly twelve feet in girth. It was there, I was told, that Calvin burnt Servetus. The only historic tree I have heard of in Switzerland is the lime-tree of Fribourg. The men of Fribourg, at the battle of Morat, put branches of lime in their hats, and one of the victors hastened to tell the victory to his townsmen, and, before dying, he had only strength to raise aloft the lime branch, which was planted on the 22nd of June, 1476.

In 1880 I spent the last fortnight of August at Rosenlaui and Grindelwald, and I was struck by the absence of animal life, particularly in the former place. Fir woods are known to be silent woods, but I saw neither birds, nor rabbits, nor game of any kind; and artists could sit out all day without being bothered with the plague of midges, gnats, or flies.

EARTHWORMS AND THE GROWTH OF SOIL.

By G. H. Kinahan, M.R.S.I.

AMONG the readers of Science-Gossip there are evidently a large number of observers, and I may suggest that some of them should turn their attention to the growth of soil.

I have been studying the growth of soil for years, and already have published some of the facts that I have collected (Geol. Mag., vol. vi. 1869, pp. 263 and 348, "Valleys and their Relations to Fissures," &c. appendix p. 223, "Geology of Ireland," chap. vii. page 287) which give results very different from those put forward by Dr. Darwin in his recently published work, "Vegetable Mould and Earthworms."

In Ireland undoubtedly vegetable growth and decay aids far more in the growth of soil than the worms; while worms and ants will not work together in the same place; and I strongly suspect that if survey were made of the Irish lands where a portion of the soil is due to the work of worms, and of the Irish lands where a portion of the soil is due to ants, the area of the latter would be equal to, if it did not exceed, that of the former.

It appears to me remarkable that such a painstaking and acute observer as Doctor Darwin should have so entirely overlooked "ant work" when their work is so conspicuous. Look at the mound they will build up, or the spaces they will cover over with soil during one season! or how rapidly large stones on the surface are buried! Darwin, indeed, has called attention to this burying of surface stones, but gives all the credit to worms, although under some of the stones that were more deeply buried he only found ants. My experience, however, is that, if you turn over the large stones on the surface of grass-land, nearly invariably all the more deeply-buried stones are those that have ants alongside or under them, while many of the stones still loose have a network of worm burrows under them.

Darwin lays great stress on the size of the worm casts in India, but what are they compared with the ant-hills of England, Ireland, or Scotland?—a mere bagatelle—while they are mere flea-bites when compared with the ant-hills of Asia, &c.

Points of interest in reference to worms, to be examined into, are,

1. Do worms in growing grass (that is, grass from four to twelve inches or more high) burrow at all? To me it would appear that the major portions are in the roots of the grass, close to the surface of the ground.

2. After rain in summer do not the worms come out to feed as freely in the day as at night? Ducks appear to believe in this, as they would just as soon go looking for worms after a shower of rain as in the morning.

3. How do worms travel? and is it due to their mode of travelling that on certain mornings so many of them are found dead in certain places?

4. If you dig a deep trench or pit, how is it that often after a shower or a wet night you will find worm casts at the bottom of it?

5. How is it that if a callow or meadow is flooded all the winter, in the spring, when the water is taken off, and the grass begins to grow, worms appear? They can scarcely have remained in the ground, because if you open drains across the callow when you take the water off it, you will not find worms.

Other more or less interesting and undecided questions in regard to worms, will suggest themselves to any one who takes up their study.

Parrots.—I heard a queer tale of a parrot lately. He belonged to a medical dispenser at a London institution, and lived in the infirmary. His master had, alas! a sad failing, one that eventually cost him his appointment. He drank. Parrots, some say, never do drink even water, but this is a mistake. My parrot enjoyed water greatly. However, this especial doctor's parrot after a time invariably saluted his master in the following way: "Here's the doctor drunk again; drunk again—the doctor." The bird had heard some of the officials or patients express themselves in the above forcible, if not refined language.—*Helen E. Watney.*

NOTES FOR SCIENCE CLASSES.

PART II.

[*Continued from page* 11.]

In tracing out the different parts in a long: section, is more simple, than by a trans: section. If possible, both sections should be exhibited at the same lesson. It is, however, more difficult to cut long: sections than trans:, especially of hard woody stems. The fact is, it requires a little more patience. In cutting the lime, it is well to use methylated spirit on the razor blade, to float away the sections without injury. Invariably use water for all sections of cellular tissue, such as herbaceous stems, or leaves, but methylated spirit for ligneous sections. When cutting any section, hold the razor handle firmly in the right hand, with the blade resting on the first finger of the left hand, and gently press the point towards the left shoulder; never do as inexperienced microscopists often attempt to do, cut the section by pulling the razor in the direction of the right shoulder. With a little practice the student will be able to cut excellent sections with ease.

Compare each portion of the cellular and vascular tissue of the long: section with the trans:, so as to make it familiar. First glance at the medullary opening of the lime:—1. (fig. 38). It is a widening of the medullary ray, which can be traced in the trans: section, to its connection with the medullary sheath, and is composed of thin walled cells. 2 is the cambium. 3. Xylem; examine this portion carefully, find out the tracheids, lying near the cambium, then the dotted and spiral vessels, lying near the pith. 4. Also find a portion of the medullary ray. 5 consists of flattened muriform cells; then we come to the bark (phleum); look first at 6, which is soft bast, and 7, bast fibres, both combining to form the phleum. Note the cork-cells, so as to recognise them in any other section afterwards. Compare also the cortical ground tissue, 8, containing chlorophyll, adjoining the epidermis.

Our next (fig. 39) is a section of the leaf of the cherry-laurel; this must be cut betwixt an incision in a carrot root, as it is impossible to hold it in the hand and take off the sections in water. Our object in taking the specimen at this stage is to follow out the position of the xylem and phleum respectively. The phleum being on the outside of the fibro-vascular ring, in exogenous stems, we should expect the same position to be maintained in the leaf, thus it ought to be found near the lower surface, and the xylem next the upper surface. In preparing the section let it be cut through one of the veins, near the midrib. A good plan is to cut a square piece, about the centre of the leaf, and place it in the carrot. Begin to observe the different portions from the upper surface: 1 will be the epidermis; then, adjoining this, will be, 3, cellular tissue (named from its resem-

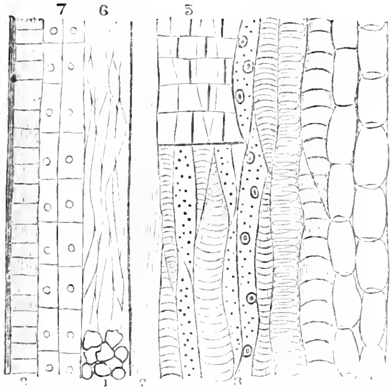


Fig. 38.—Longitudinal Section of Lime (*Tilia Europæa*).

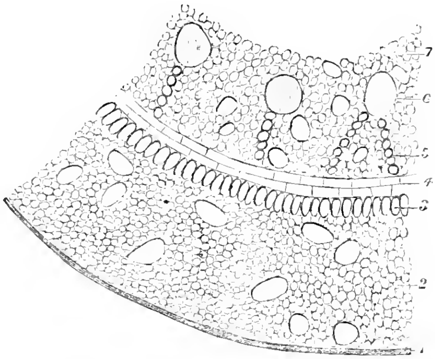


Fig. 40.—Transverse section of root of Iris.

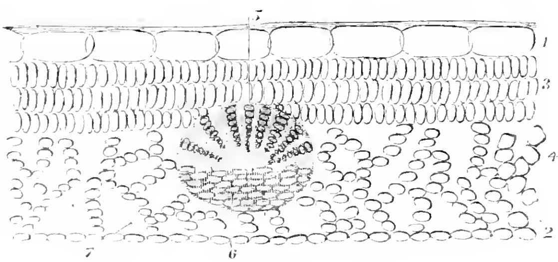


Fig. 39.—Transverse section of Cherry-laurel leaf.

blance to wooden palings, palissade tissue), it is packed closely, like eggs in an Irish crate, hence the upper side of a leaf is darker in colour than the lower; 4 is spongy cellular, or ground tissue; here we trace abundance of air spaces, then we come to the lower epidermis, 2; note the difference. The next and most important part is the fibro-vasc: bundle. When seen under a low power, it has a whitish appearance. 5 is the xylem; observe the spiral vessels, much darker than the phleum. They are traced clearly, if

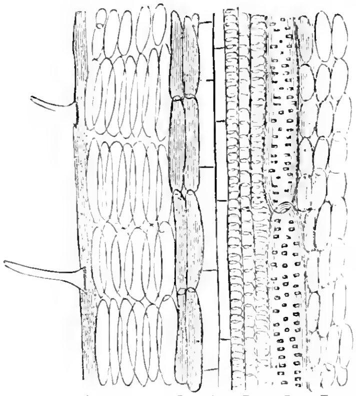


Fig. 41.—Longitudinal section of Iris root.

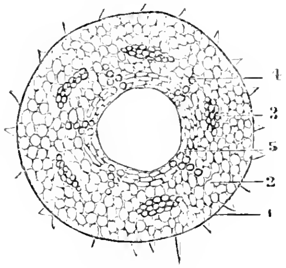


Fig. 42.—Transverse section of radicle of Bean.

stained by running a drop of weak solution of magenta, under the cover-slip; the phleum, 6, is formed of soft bast only. Now note the guard cells of the stoma, No. 7.

Before proceeding further, we should advise the student to study the root; an excellent specimen may be secured at any time from the garden Iris (*I. Germanica*, fig. 40). It is best cut with water on the razor blade, then float it off, in a watch glass, and select the best sections for study. No. 1 is the thick epidermis; 2 and 7, both ground tissue; in 7 it takes the form of packing parenchyma; 3 is the bundle-sheath; 4, pericambium; these are very thin, transparent, and fragile cells; 5 and 6, xylem, but of different vessels, as will be observed in the long: section; 5 are spiral, and 6, pitted vessels. In the long: sections (fig. 41), compare with trans: The same numbers are employed to explain each part.

Examine also an exogenous root; place the garden-bean in a small quantity of water, and allow it to germinate on the mantelshelf; when the radicle has made considerable growth, make a few sections. Take a portion near the collum, and trace out the entire trans: section under a low power, after staining it with magenta. This is a simple and pleasing operation; drop a small quantity on the slide close to the cover slip, allowing it to run in contact with the section; then place a strip of blotting-paper on the opposite side to extract the magenta, it will stain the xylem a bright pink, thus rendering it unmistakable.

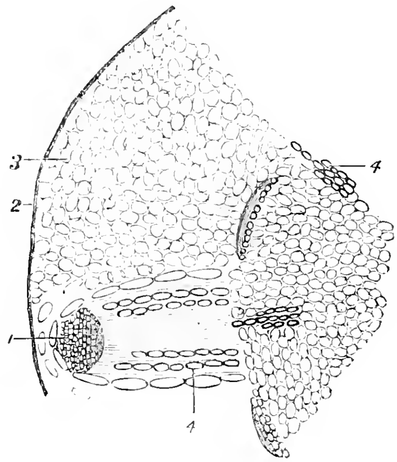


Fig. 43.—Transverse section of radicle of Bean, to explain growth of root.

Observe, in the entire section, No. 1 is the epidermal layer; 2, ground tissue; 3 and 4, xylem; note the spiral vessels in the latter, in a long: section; 5 is the phleum. Now cut another trans: section, to explain the growth of a lateral rootlet, cutting it from the radicle, through the small protuberance, detected in abundance, on the older part, and immerse the section for a few minutes in a strong solution of potash in a watch-glass. No. 1 is the growing-point of the rootlet; note its position, and where it takes its rise above the spiral vessels of the xylem, in the old radicle; 2 is the epidermal layer of the mother-root; 3, ground tissue, and 4-4, xylem. The phleum is not so readily detected in the radicle, it is easily made out in the old root.

R.

WHITE CALLUNA.—In reference to query in the December number of SCIENCE-GOSSIP respecting a white variety of *Calluna vulgaris*, may I say that I have found it several times on the Sidlaw Hills (Forfarshire), but it is uncommon, and its possession is considered in Scotland as likely to render the possessor "lucky."—*M. E. Pope.*

NOTES ON THE NATURAL HISTORY OF JERSEY.

By Edward Lovett.

[*Continued from page* 38.]

Land Plants and Animals.

THE title of this paper suggests such a wide and exhaustive subject, that it is well to disclaim at once any attempt on the part of the writer to do more than refer to localities and species of particular interest, or to incidents as to the occurrence of specimens likely to commend themselves to the natural observer.

As we have briefly glanced at the general outline and geological features of Jersey, we will next notice the plants, to the existence of which, its small, but diversified surface affords favourable localities.

As might naturally be expected from its general position, the richness of its soil and its breezy headlands, sheltered slopes and warm damp valleys, the botany of Jersey is rich and varied ; in fact, to refer to a custom among the farmers there, so dense and luxuriant is the growth of pasture that Jersey cattle are always tethered, when grazing, in order that they shall not damage their food by trampling down more than they consume.

With regard to trees, nothing very important presents itself. The island was at an early period densely wooded, but of late years the demand for ground for cultivation has rendered it necessary to destroy an enormous number ; still, there are many bits of sylvan beauty left, although all the trees that are at all exposed present the appearance usually seen in districts near the sea, particularly when subject to the prevailing south-westerly gales ; they are stunted in growth, principally on the windward side, and bend towards the north-east, giving all the appearance of being under the influence of a strong wind even on a calm day.

The shrubs are better able to develope, and in favourable localities tend to add much to the sublime beauty of many parts of the island.

The plants of Jersey are interesting, inasmuch as many very rare species occur, and the existence of rare plants in an island is particularly so, as it is there that the last stand of a dying-out species may be made.

We are indebted to Mr. Piquet, of St. Helier's, for some valuable notes as to the occurrence of species in special localities, and from which we have arranged the following.

On marshy ground, such as occurs above the district of St. Aubin towards St. Ouen, where the nature of the rock causes somewhat imperfect drainage, may be found *Neottia æstivalis*, *Cladium mariscus* and *Ranunculus ophioglossifolius*.

On syenitic localities such as St. Brelade, occur *Hypericum linariifolium* and *Hypochœris maculata*, whilst upon the clay slates of St. Peter, and similar spots, grow *Silene maritima* and *S. nutans.*

The rich soil formed by the decomposition of syenite is favourable to *Spergula subulata* and *Brassica cheiranthus*, whilst in the wet soil of the valley deposits grows *Hypericum quadrangulum*, and where this is of a sandy nature, *Cicendia filiformis.*

On breezy headlands may be found *Helianthemum guttatum*, and in thickets *Serratula tinctoria.*

Euphorbia peplis, *Matthiola sinuata*, *Lagurus ovatus*, and *Raphanus maritimus* occur on sandy localities such as that of St. Ouen's Bay, as also Gorey. As regards the former place, the following additional plants are to be met with : *Echium violaceum*, *Armeria plantaginea*, *Cyperus longus*, *Centaurea Isnardi*, *C. paniculata* and *Sinapis incana.*

The curious *Cotyledon umbilicus* is to be met with commonly on old walls, rough rock surfaces and detritus ; and the dodder, *Cuscuta epithymum*, spreads its curious web over the gorse.

The ferns of Jersey are no doubt familiar to most persons who have visited the island, but it is probable that not only many species, but also many interesting facts connected with them, may have altogether escaped general observation.

There are many species that love limestone districts, that are either very rare or altogether wanting in the island ; *Ceterach officinarum*, for example, is rare, occurring *only* in the parishes of St. Lawrence and St. Clement, whereas in some English localities it is extremely abundant. *Scolopendrium vulgare*, on the contrary, is common, and forms quite a feature in the beautiful shady tree-arched lanes. *Adiantum Capillus-Veneris* has been found, but is very rare ; *Asplenium Adiantum-nigrum* and *A. lanceolatum* are to be found plentifully on banks and rough granite walls ; the former is more common in the eastern part of the island, thinning off towards the western, whilst the latter is more common in the western half, thinning off towards the east ; in the middle of the island both occur fairly divided : as *A. lanceolatum* delights in a dry breezy locality, this, no doubt, accounts for its being so abundant on the high ground from St. Aubin right across to L'Elac.

This species presents many well-marked varieties that do not seem to have been at all worked out : one very peculiar one was found at Bouley Bay by Mr. J. Sinel, of Bagot, and recorded.

Asplenium marinum is chiefly found on the north coast, owing to the numerous caves and rock fissures that occur in that part of the island, and where also the prevailing strong winds are not able to reach it. Here it is that magnificent clumps of this beautiful fern, sometimes with fronds over two feet in length, may be seen growing far out of human reach ; indeed it is often a subject of conjecture how the spores could be lodged in the roof of a cavern apparently only accessible from the sea, unless they were washed there by the waves, which in rough weather must almost drag them from the spot where they first planted them.

Asplenium Ruta-muraria is very common in the crannies of old walls and buildings, particularly so in the walls of an old fort in Bouley Bay, where it attains to a fine size. *A. trichomanes* is local, but fairly abundant, often growing on banks, and nearly hidden by herbage; in favourable localities its fronds sometimes reach a length of seven or eight inches.

Athyrium Filix-fœmina and the Lastreas are common, and in damp sheltered situations are often in grand luxuriance; *Lastrea dilatata* particularly exhibiting quite a tropical growth along the margin of some hidden valley streamlet.

Blechnum boreale occurs also on the damp margins of valley brooks, and is very abundant in such situations.

Although it is not often that *Osmunda regalis* is seen in its native spot in the island, yet it may be seen if a little trouble be taken to climb some of the rugged rocks of the north coast. When visiting the cave referred to in a former paper, we were pleased to see a fine quantity of this "royal" fern growing in the vertical syenite rocks, in fissures dripping with the water drained from the high ground above, and perfectly safe from any chance of molestation.

Pteris aquilina is a striking feature in the landscape on all the northern sloping hills, particularly at Greve-de-lecq and St. John, where it often grows to a height of six or seven feet; as in England, it is of considerable use for litter, and is collected for that purpose.

Perhaps the most interesting fern in Jersey is *Gymnogramma leptophylla*. This elegant and rare little plant is somewhat remarkable in its distribution, appearing to extend across the island from south-west to north-east, in a belt of not more than a quarter of a mile in width: as this does not appear to follow the course of any dyke, intrusive vein, or other geological feature, this fact is peculiar and, no doubt, attributable to some other cause.

As regards the mammalia of Jersey, a somewhat formidable list is given in Ansted's 'Channel Islands,' and includes a number of domestic and introduced animals. This is unfortunate, as no notice should ever be taken of instances of this nature, for in that case what mammalia Middlesex might boast of when the collection at Regent's Park came to be included!

There are, however, many interesting mammals indigenous to the island, and perhaps few more so than the black rat, *Mus rattus*. This rat, now almost extinct wherever the brown one has gained a footing, still occurs plentifully in some of the Channel Islands. We understand that in Sark the brown rat is unknown, and hence *Mus rattus* still holds undisputed sway: this is very interesting, for Sark, of all the islands, is the most difficult on which to land, and it is well nigh impossible for the brown rat to get ashore there, particularly as the "imports" of the place are not of a nature to facilitate a "stowaway" using them as a means of effecting a landing. Jersey, on the contrary, has a harbour and a trade, hence the brown rat is common, and is "improving" the black one off the island: still it is yet to be found, and within the last few years it has been seen at Longueville and other farms and even in St. Helier's itself, although Ansted says it is quite extinct in Jersey.

The water vole is fairly common near a piece of water called the Samarez canal, as also in other favourable localities. The shrew, weasel and mole are also common, a curious white variety of the latter has been taken in which the hair was rather longer than that of the common mole, although it was, no doubt, only an albino form. *Plecotus auritus* and *Vespertilio pipistrellus* are the only two bats, we believe, known in the island. Rabbits are extremely abundant, as might naturally be expected, but the squirrel exists only in the recollection of some of the oldest inhabitants.

When we come to consider the birds of Jersey, we pass from a very limited to an almost unlimited subject; for its geographical position causes it to be visited, especially in winter, by a large and varied number of birds. Of course it would be impossible to deal in more than a cursory manner, with such a wide and comprehensive subject, in notes like these; but through the kindness of Mr. J. Sinel, of Bagot, Jersey, who has given this subject a great amount of study and observation, we are enabled to quote several instances of interest with regard to the birds of the island.

Two or three specimens of the golden eagle have been recorded, one in 1849 and one in 1856, and only recently an eagle (species unknown) was fired at in the parish of St. Saviour. The kite is frequently seen and the peregrine falcon occasionally; a fine specimen of the latter was killed in March 1881, and others are recorded as killed in 1876 and 1877. A curious fact in connection with the starling is that it is a winter visitor *only*, in Jersey, not remaining in the island to breed.

The fire-crested wren (*Regulus ignicapitis*) occurs with *Regulus cristatus*, though neither are common. The hoopoe is occasionally seen, and five specimens have been recorded to the gun of one individual.

The red-legged partridge, once extremely abundant, is now almost unknown: this is an instance of an island not being conducive to the lingering on of a species. The little bittern has been recorded in 1859 and in October 1880, and the grey phalarope is frequently met with, a fine specimen being killed only a few weeks since. The great northern diver, locally known as "grand loup," is very common in the winter months, and numbers are killed, but seldom in full plumage. The red-throated diver is also very common, and the black-throated diver frequent, both are locally termed "cadras." The merganser is very common, and, with the divers, may often be seen in the market for sale; the local name is "allicracq.' Of the grebes the Sclavonian is the common one of the island, and with very few exceptions is always killed in winter plumage, its local name is "petite pouchette:" this grebe is rare in England, whilst the little grebe, common in England, is rare in Jersey. The red-throated grebe, though common, is not so much so as the Sclavonian, it is known as "grande pouchette:" and the great-eared grebe, common in England, is very rare in Jersey, very few having ever been seen.

Of the sandpipers, vast numbers of which frequent the southern bays, the purple and the pectoral are among the best that occur. The turnstone is also abundant in all the sandy bays. Great numbers of brent geese visit the island during the winter months, arriving often so early as the middle of October and remaining frequently as late as May.

Among other rare birds two specimens of the spoonbill are recorded as having been shot at St. Ouen's pond about 1860, and on December 8th, 1879, two specimens of the great bustard were shot in the island near Longueville.

Vast quantities of gulls frequent the shores, one favourite haunt being near the harbour of St. Helier's at low tide, where they are of service in removing refuse that they find there. Among the best we may notice the gull, the great black-backed gull, and the lesser black-backed gull. The kittiwake, herring and common gulls, are very common, and the laughing gull frequents the northern coast.

The following is an interesting case of gulls breeding inland. A farmer in the island had a tame herring gull, and during the severe weather of January 1881, a number of other wild ones visited the farm; a pair of these remained in the locality till the following May. They nested in a turf-hedge at the top of a sloping field, at the bottom of which was a small pond; seven eggs were laid, and six young herring gulls hatched, which had their wings clipped in due course, and became quite domesticated, walking about the farmyard amongst the poultry, but always keeping in a little squad by themselves.

The nearest coast was three miles distant from the spot where the gulls nested, and far from being a wild open locality, it was close to the farmhouse and near a public road.

For an island, Jersey is rich in reptiles, but this is only another proof of its recent continental connection, the existence of the green lizard itself being quite sufficient evidence. This lizard, *Lacerta viridis*, is of particular interest; it is common on the continent, but, if not quite extinct, certainly extremely rare in England. Although common in the island, it promises to become very scarce, if the disgraceful way in which it has been hunted and killed of late, for no particular purpose but mischief, be not discontinued. It is often to be seen sunning itself upon some fern-covered bank, and seems to affect a spot where grows the wood sage, *Teucrium scorodonia*, the size, tint, and variation of the leaves of which bear a most striking resemblance to the plates, size, and colour of the head of *L. viridis.*

On the lichen-covered boulders of conglomerate that form the lower part of the cliffs near Bouley Bay, may be seen *Lacerta agilis;* its close resemblance in colour and markings to the rocks, off which it is very seldom seen, is perfect, and makes it difficult for even a practised eye to detect its position unless it moves. Upon the slightest alarm this agile lizard disappears like a flash of light down a rock crevice, hence it is a species that is likely to escape the hand of the destroyer long after *L. viridis* has become extinct in the island.

The slow or blind worm, *Anguis fragilis*, is common generally, frequenting old ruins or scattered rock débris; the young are interesting in that they closely resemble the curling rhizome of *Pteris aquilina*, near which they may sometimes be found, when turning over loose stones, &c.

The snake is fairly common, and often grows to a large size; it is found principally at St. John and St. Brelade; one taken at the latter place measured four feet in length.

The toad, frog, and a newt may also be included, though they present but little of special interest.

(*To be continued.*)

NOTES ON *KERONA POLYPORUM.*

WITH C. H. Griffith I quite agree that Mr. F. George must have hunted for his Hydras in very dirty water, for them always to have been afflicted with that direful parasite which, in many instances, forbodes them no good, viz. *Trichodina pediculus.* I cannot speak so accurately about *T. pediculus* being constant in *H. fusca*, but I can say that *Kerona polyporum* is not always to be found on either *H. vulgaris* or *H. fusca.* All the specimens I have found in the ponds this season have been unusually free from the latter parasite, and I am well acquainted with it. I had begun to think I had been unusually free this season from these pests. I had prepared a trough especially for my Hydras, and for seven weeks all went well with them; they budded, and seemed a thoroughly happy family. I took pleasure in seeing them capture their food, *Daphnia pulex* —watching them toy with it as a cat would a mouse, as if to create a keener appetite for their delicious morsel; I kept their trough well supplied with fresh pond-water, removing the débris of the defunct Daphnias. By this means I hoped to keep away these parasitic pests. A week's hard business caused me to neglect them, beyond occasionally giving them a little fresh water, and, when at the end of the week, I examined them with a low power, I found them infested with *K. polyporum*; one was already in a dying state, and, being warned from past experience and Pritchard, that Hydras infested with *K. polyporum* die (?), I determined to try an experiment. I removed one of the Hydras and put it in a thoroughly clean trough; having placed the trough under the microscope, I found that Hydra was "eaten alive" with *K. polyporum.*

Every other day I gave the Hydra a good bath by laying the trough in a deep saucer filled with water; refilling the trough with fresh water; at the end of a fortnight I had materially diminished them. I still continued the bathing, occasionally adding a piece of alsinastrum to draw off the *K. polyporum*, which I found very effective. I kept the creature well fed, occasionally giving it a *D. pulex*, and now as I am writing at the end of five weeks, the creature is alive, in good health, and perfectly free from *K. polyporum.*

Those left in my large zoophyte-trough all succumbed possibly to these parasites, and went the way of all things in nature, and strange to say, *K. polyporum*

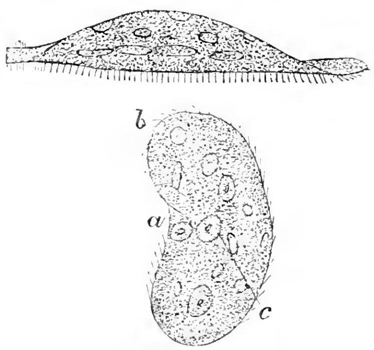


Fig. 44.—*Kerona polyporum.*

disappeared too. My experiment went a long way to prove that cleanliness was a great factor in curing Hydra of its troublesome guest. Although *H. fusca* is the host of *K. polyporum*, yet it is a free swimming creature, and is as capable of getting its living that way as crawling over the knotty tentacles and slimy body of *H. fusca.* I captured a few, and placed them on a glass slip, covering them with a thin covering-glass. It made a capital live-box, leaving them sufficient room to swim about, yet limiting their scope of locomotion. Under the circumstances, I was able to observe and make a sketch of them. Fig. 44 represents *K. polyporum* as seen crawling over the body or tentacles of *H. fusca*, and its ventral side, as seen in its free swimming state; *a* being the oral aperture through which a stream of fluid passes, the current being sent down by the lashing of the cilia *b* at the head of the creature.

This aperture seems to be made up of two valves, opening very slowly, and closing with a sudden snap. In the vacuoles *c* monads could be plainly seen, undergoing the process of digestion.

Canterbury. T. B. Rosseter.

A WEEK'S RAMBLES WITH A HAMMER IN THE ISLE OF WIGHT.

By W. W. Watts, B.A.

[*Continued from p.* 31.]

On the third day I started for Headon Hill, intending to work round the hill, as the dry winds had consolidated the pools of mud formed from the Osborne clays and the Middle Headon beds, and it was possible to walk round the whole hill.

The first thing that struck me on approaching the hill was the westerly dip of the beds, which does not agree with the dip assigned to them in a section published a year ago. The section to be seen at the north end of the hill is much the same as that given for the similar beds in Colwell and Totland Bays. The Bembridge limestone is found at the top, and underneath it the mottled Osborne marls, the whole thickness of which may be seen along the section, showing a fairly well-marked terrace of limestone at one horizon. Below it comes clay, with large specimens of *Paludina lenta*, and then a thick bed of limestone, which forms a well-marked terrace all round the hill to its outcrop at the southern end. This contains a great number of specimens of Planorbis and Lymnæa; then come sands, and then the total thickness of the Middle Headon, including (1) a clay band with *Cerithium ventricosum* and *C. concavum*, which weather out in vast numbers; (2) a thin freshwater limestone; (3) the Venus bed with the usual fossils; (4) numerous clays, and then a limestone with Limnæa and sands below, which appear to be on just the same horizon as the last exposure of the Warden Cliff sands seen just south of the anticlinal. Below this the section is obscured by a landslip, which repeats the above-mentioned beds, while down on the shore line is a mixture of timber and mud, often with finely-weathered fossils from the various beds above. I carefully traced these beds round the hill, and found them on the fine exposures seen at the southern end, the thick limestone forming so marked a horizon that there was no mistaking the beds. But besides this, the Lower Headon limestone afforded a good horizon, and also the thin freshwater limestone and the *Cerithium ventricosum* bed of the Middle Headon. Among the more important features noticed in passing were: (1) the thin Osborne limestone thickened on the south to a very considerable extent; (2) the Upper Headon limestone and sands thickened and thinned in an inverse relation, and lignite appeared here and there in these beds; (3) the *Cerithium concavum* beds in one place formed a bastard limestone with beautiful and large specimens of *Natica Studeri* and other fossils; (4) the Venus bed became lighter in colour and contained flint pebbles, but it contained the same fossils, though not in quite the same proportion as elsewhere; (5) underneath the chief Lower Headon limestone (How Ledge limestone) Appean bands of limestone separated by beds of clay occur just like those of Totland Bay. The lowest of these clays passes down into the Upper Bagshot sand, where the section was picked up on the following day. Many good opportunities for collecting occurred at various spots round the hill; for instance, beautiful specimens of *Paludina lenta* occur in one place weathered out from the clay above the Upper Headon limestone; then, often good specimens of Planorbis and Limnæa occur weathered out, while the common fossils of the Middle Headon, such as *Cyrena obovata*, *Cerithium ventricosum*, and *C. concavum*, occur in thousands, and many other of the fossils are easily found. The section at the south end of Headon Hill very closely resembles that of Totland and Colwell Bays, with the few exceptions mentioned above, and except in the case of one or two local thickenings such as the Upper Headon limestone and the Osborne limestone, which are thicker than elsewhere.

On the following day I went straight to Alum Bay, and picking up the section at the Upper Bagshot sands, where I left it on the previous day, I continued to work my way downwards. The upper sands showed little of interest, except some beautifully white sand, with a high dip indicating a very sharp bend in strata which are almost horizontal in Headon Hill.

The Barton beds were searched with considerable profit, and yielded specimens of *Fusus longævus*, *Voluta spinosa*, *Chama squamosa*, *Corbula pisum*, nummulites, &c. The shells were best collected weathered out in the cliffs and taluses.

The Bracklesham beds below the Barton are unfossiliferous in Alum Bay, but still they are interesting in several respects, for they contain beds of lignite which show underclays with rootlets. At their top too, or rather perhaps at the bottom of the Braton beds, occurs a band of rounded flint pebbles, which stands out from the more easily weathered sands, and looks threateningly down on those who pass below. Some of the sands are of an unusual colour, one band being a beautiful crimson.

The next group is the thick sands of the Lower Bagshot, which furnish most of the well-known Alum Bay sands. The most interesting band of this is one of the beds of pipe-clay, from which a large number of leaves have been collected.

The London Clay is not a very interesting deposit, as it consists of a monotonous dark clay with occasional bands of septaria or clay ironstone, or a band of pebbles and few fossils. *Panopæa intermedia* and *Pholadomya margaritacea* may, however, be collected, with some gasteropoda and occasionally a septarian nodule crowded with shells.

The curious mottled Plastic Clay is the lowest bed of the Tertiaries, and is probably equal to the Woolwich and Reading beds of the London basin. This clay rests on a fairly regular base of chalk with flints, and is at a very high angle of dip, and towards the top of the section, inverted.

The chalk contains few fossils. A curious point about it is that the flints generally smash to pieces on being touched with a hammer, due to a brecciation *in situ*, probably induced by the same forces which produced the rolls in the strata, as Mr. Bristow suggests.

The next two days, though an inadequate time, were all I could afford to spend on the Secondary geology of the island, and that only on the western side.

The first of these days was spent at Compton Bay, where I started geologising underneath the great chalk cliff. A few Upper Greensand and Chalk Marl fossils were found, *Ostrea vesiculosa* and annelida, and a large ammonite. The Gault was not well exposed, as the slips from it encourage vegetation; it contains few fossils. Neither is the Lower Greensand very fertile in fossils here, and it seems thinner than on the south side of the Atherfield anticlinal. The Wealden strata, however, were well exposed and fossils obtained from several beds, some of which were exposed on the strand and others in the cliffs. The beds seemed to be of a great thickness, but the low dip doubtless made the thickness appear greater than it really was. Besides finding Cypris, Paludina and Cyrena in the soft and hard clays, masses of wood were weathered out on the shore. The Wealden strata come to an anticlinal at Brook Point, and as the axis of the bend is inclined, lower and lower beds are found out at sea when the tide is low. I was not lucky enough to see the pine raft, or fossil forest, which is exposed here when the tides are very low.

The section from Brook Point to Atherfield Point is not very interesting and not particularly well exposed, so the following day I started at Atherfield, where the lowest beds of the Lower Greensand come in, in their fullest development, in a series of magnificent cliffs. It is not necessary to give a detailed account of the beds, as they are so well given in Bristow's "Memoir." I was not able to spend very long in collecting, as I had to make my way to Ventnor, and thence to Sandown that night. I had time, however, to collect fossils from the Lower Exogyra group, amongst which were *Terebratula sella*, *Rhynchonella Gibbsii*, *Exogyra columba*, and a Pecten, and also a Serpula and Rhynchonella from the Walpen clay and sand.

I made my escape from the shore by means of a ladder and other conveniences for climbing which now disfigure the beautiful Blackgang Chine, and walked along the magnificent mural cliff to Ventnor, whence I took train to Sandown.

The last day was spent in an exploration of the Tertiaries of Whitecliff Bay, where a walk from Sandown over Bembridge Down soon brought me. The view from this down, to my mind, is unsurpassed in the island. It strikes one so suddenly and effectively on reaching the brow of the hill. A sharp descent of the northern side soon brought me down the other side into the bay, where I found the strata rather different from those of Alum Bay. One character was much the same: the beds had a high dip as far up as the lowest limestone, but this (the Bembridge in this instance, the Lower Headon in Alum Bay) rapidly became horizontal. The Plastic and London clays had much the same aspect in the two bays, the former giving a beautiful hue to the water, where washed up by it, forming a fine contrast with its green colour on the chalk. The Lower Bagshot beds, too, were sandy, but showed no trace of a leaf bed. A conglomerate of black flint pebbles brought in the Bracklesham beds, so well described in Mr. Fisher's paper.*

Here I collected some time, but found the fossils exceedingly difficult to preserve. The Nummulite bed, however, yielded a splendid number of weathered-out specimens.

The Barton clay and Upper Bagshot sands follow, the latter containing unstable sandy casts of mollusca, which, however, are not easy to find.

The Headon appears under a very different aspect from that at Alum Bay, the Lower Headon consisting of clays and lignites, but with the usual fossils.

Under the Middle Headon and forming its basement bed is a marine band containing many shells, not in a very good state of preservation. Among them are *Cardita deltoidea*, *Voluta spinosa*, *Ostrea flabellata*, *Cytherea incrassata*. With the luck which followed me all through my excursion, I found these beds exposed on the strand, and reaped an abundant harvest from them. The beds above, too, were well exposed; among them the Venus bed was readily distinguishable from the number of *Cytherea incrassata*. The Upper Headon, too, was without any limestone, and consisted of sands and clays, and was followed by the mottled marls and clays of the Osborne series, with their thin band of yellow limestone and bands of comminuted shells.

The Bembridge succeeded, with great terraces of massive limestone, which weathered into curious tabular lumps, masses of which formed the capping of rude earth pillars formed of the stiff marls below.

The Bembridge marls, with much their usual character, follow and complete the section to Watchhouse Point, forming the highest bed found on the eastern side of the island. A climb back over Bembridge Down when it was getting very dusky closed my week's work in the Isle of Wight, and I cannot do better than recommend any young geologist who has a week to spare to go and use his hammer in the Isle of Wight. He will find there plenty of fossils, plenty of rocks, plenty of work, plenty of walking, and, after his day's work, plenty of comfort by the fireside of his inn amongst hospitable if homely people.

In conclusion, I must take this opportunity of acknowledging with many thanks the kind help afforded me by Mr. H. Keeping on the first two days, for without his help I should have been much longer in thoroughly learning to recognise the succession of the Tertiary rocks.

* Quart. Journ. Geol. Soc. xviii. 65.

HOW TO MAKE WAX CELLS.

YOU lately drew attention to some remarks I made at a recent meeting of the Manchester Microscopical Society, on a novel method of making cells of wax on microscopical slides. The system I described is the contrivance of Mr. F. Barnard, of the Microscopical Society of Victoria, and was brought to my notice by the Rev. I. I. Halley, of Melbourne. I should be obliged if you would state in an early number that the credit of the new method is due to Mr. Barnard; and as a description of it may be interesting to some of your readers, I append some extracts from the original paper:—"The cells can be made of beeswax, white wax, paraffin, or stearine, or a mixture of these substances. Take a small piece of wax, according to the size and depth of the cell required, place it in the middle of a glass slip, warm it thoroughly over the flame of a spirit lamp, then press it upon the slide perfectly flat and even, with a smooth surface. This is easily done by means of a gauge, made thus:—on each end of a slip of glass, cement with balsam small pieces of paper, card, or glass of the thickness of the required cell, moisten the under side, and press upon the warm wax till down as far as the ends will allow; by moving this gauge about a little, you will get a tolerably smooth and level cake of wax on the slide, the thickness of the gauge. When cool, place the slip on a turn-table, and with a penknife, or other convenient tool, turn out the centre to the size required; thus a cell is formed, which it is necessary to clean, as the marks of the knife will remain on the bottom. This is easily done with a small rag moistened with benzine. No cement is required. The cover glass is simply warmed and placed on the wax cell, to which it adheres quite firmly. The cells can be made any colour by mixing dry colours with the wax. This system is especially useful for making deep cells. By covering the slide with a solution of gum tragacanth, to which a small quantity of sugar has been added, allowing it to dry before the wax is placed on, the cell, after it has been turned up and finished, can be detached by immersing the slide in water. It can then be placed on the centre of a slightly heated clean slide, to which it will firmly adhere. This obviates the necessity of cleaning the slide with benzole, and is the best method for transparent or fluid mounts." From this description it will be seen that the advantage of this method is, that a cell can be made of any size and of any height at one operation; and that no cement whatever is required. If the wax is properly prepared, the cells will stand any fair usage, and are not liable to leak or crack.

JOHN BOYD.

HOLIDAY RAMBLES.

IN FAR KINTAIL.

By G. C. DRUCE, F.L.S., Hon. Sec. Oxfordshire Nat. Hist. Soc.

[*Continued from p. 35.*]

AT Shiel House after a twenty miles' walk, some slight rest was made, but at last the sky had fairly cleared, and there was all the glory of Glen Shiel and Kintail before, just in front Scuir Ouran, a huge hill near 4000 feet high, rising from within a few feet of the sea level almost without a break, certainly without a perceptible break, to its grand rocky coronet. What monarch was there near to rival? What scene more wild than the glen to which it formed so fine an ornament? The opposite side of Glen Shiel was not less steep if lower, but instead of separating into distinct hills, it formed rather a finely broken crest of fantastic outline, like some rocky reef against which only the waves of cloud and mist broke from time to time; at the glen's head some burn came tumbling down in rapid violence, but not surrounded here with any mass of foliage, the whole glen being almost destitute of trees, except by the riverside where some dark alders added little to its liveliness, and the few birch were too small and scattered to be readily distinguished from the stony slopes on which they grew. So it was to Scuir Ouran we wended our steps over as rough and sloppy a two miles' walk as a traveller could object to, and then commenced a climb up the ridge which rises from the bottom of the glen and goes sheer up to the summit. There is a tradition that a Scotch piper once went to the top of Ouran playing his pipes all the time, but that on reaching the summit he died of exhaustion; without in any way reflecting upon the steepness, it occurred to us to imagine that most people would do the same long before reaching the summit, even without the pipes, not to speak of a vasculum; however, without any such tragic end to the expedition, we struggled through the thick zone of *Pteris* which girdled the lower slopes to the heather-covered rocks above, the heather here and there giving way to *Oreopteris*, or became mixed with *Carex binervis*, *Aira montana*, *Juncus squarrosus* or *Luzula congesta*; higher still *Arbutus Uva-ursi* began to put in an appearance, followed by *Lycopodium Selago*, *clavatum*, and *alpinum*; now came little plashy spots frequented by *Carex flava*, *Saxifraga stellaris*, and *Pinguicula*, while some of the great boulders now showed at their base in addition to the *Lastrea dilatata*, and *Cystopteris* seen before, the bright-looking parsley fern, and the delicate fronds of *Dryopteris*, but these oases were few and far between; the sheep nibble off everything less indigestible than heather stems. Then still higher till we can look over hills, which from below attempted to rival our kingly Scuir, now fall into their proper places of mere courtier-like attention, and the shoulders of our monarch get ornamented with the little *Gnaphalium supinum*; *Luzula spicata*, and *Carex rigida* continue to near the summit. The mountain's crown, unsullied with any Righi decoration, consists of huge blocks of stone, some few of which roughly piled up form a cairn, from which no finer view could be desired than that which now lay around us. Below stretched Glen Shiel in all its stern beauty, rising into the wonderful barrier-ridge whose points and precipices now assumed new and more wonderful shapes; behind these again other hatchet ridges, several of them in all their wonderful serrature between us and Loch Hourn, about which mountains of wonderful ruggedness were thickly congregated; to the south, Ben Nevis in all his lumpy massiveness was plainly seen, to the west the Cuchullins of Skye were tossing up their rocky peaks into the glory of the sunset which changed them in colour from time to time; to the north-east Ben Attow, a strange-shaped hill with sharp ridges and furrowed sides, seemed close enough to throw to, and then the mass of Kintail summits, such as Scuir na Cairan, blocked up the foreground, but farther away, in Eastern Ross, was the far-stretching Ben Wyvis, whose ten mile ascent is so wearisome, if not uninteresting. But perhaps it was the eastern view that was most attractive, here, at this evening hour, when all the power and beauty of that too-seldom seen sun, was casting its vivid light into the hundred glens and ravines unknown almost to tourists, that lay stretched out in puzzling mazes, watered by the rivers Beauly, the Findhorn or the Farrar; such glens as Strath Affrick with its massy rock environments, or such wild lonely glens as Strath Farrar, or Glen Elchaig, over and beyond all Nairnshire to Forres, one is almost afraid to say how far away. But the clouds on yonder ridge are hanging more closely than before, and now streaks are spreading across and a colder temperature is felt as these driving particles sweep by, and Loch Alsh is deepening into purple while one cloud above Duich is still flaming orange on that lucid green blue sky. So not satiated, but satisfied, we take leave of the mountain glory ere the gloom is fully felt, and before the stiff descent is completed, the clouds have come down lower, Glen Shiel looks more sombre, the loch is grey rather than purple; but Ouran, free from the clouds which have entangled themselves on lower hills, shines out clear in all its rocky grandeur, true monarch of the place.

The next day was to be another red-letter day, for were we not to see the Falls of Glomak, the highest in Britain, and was not the fine early morning pleasant after the torrents of wet that had come down in the night and now hung in jewelled drops upon the heather, and sundews, while the little streams were fretting themselves into foamy tears over the rocks that impeded their course? Here in Kintail the thatched cottages were covered with corydalis, while higher up the glen, in a little stream occurred a plant of new aspect, which made the heart beat in quick pulsations, toning down, however, when it was found to be *Mimulus guttatus*, possibly a relic of some old garden. About five miles from Shiel House we came to the keeper's lodge, last house of the glen, and here we asked information as to the way to Glomak; our map in this district having quite broken down, mountains being put in wrong position, some omitted, others unknown inserted, roads altered, &c., so we were obliged to ask our way. Doleful was the news: the river was in speat, it wouldn't be safe to cross it; the way was intricate, we should not find it; there was no chance of meeting any one else to inquire; we ought to have had a guide, and so on, but the way was so and so. Then on we went, feet and legs soon getting soaked through in the wet, boggy or else hard rocky walk till the river was reached; here the stepping-stones were under water, no boulders near enough to jump to, no stick to assist, gloomy was the look out; but removing the majority of garments, and gingerly stepping into the fierce cold current, clutching at clothes in one hand, with the other grasping at boulders to avoid imitating oxyria which had been washed down from the heights above, we made the unpleasant passage, and were soon again plodding up the glen which, like Shiel, had one side a huge slope breaking into a rocky crest at top and fissures with multitudinous ravines. Here was little phænogamous vegetation, but occasionally came a patch of handsome *Splachnum sphæricum* or the sombre *Campylopus longipilus*, while *Saxifraga stellaris* and Oxyria told of the heights above; on to the head of the glen, and turning eastward after about three miles walking we reached an elevated plateau of greensward, bounded southward by Scuir na Cairan, from which a few streams came sprawling down, bringing with them some Hieracia most of which had been eaten off; following up one of these gullies to about 3000 feet *Saxifraga hypnoides*, *Epilobium alpinum*, *Cochlearia alpina*, *Hieracium chrysanthum*, *Vaccinium uliginosum*, *Cherleria*, *Thalictrum alpinum*, *Juncus triglumis*, *Saussurea*, *Carex rigida*, *Saxifraga oppositifolia*, and *Silene acaulis* were added to the list, and then lower down in a sheltered gully a *pinguicula* with such splendid flowers as to come near *grandiflora* in appearance.

Now in the valley below, a river in full floods was rushing along, and a short walk brought us to the crag of a wonderful gorge. A steep bank being descended a solitary mountain ash gave a standing place from whence could be obtained a full view of the Falls of Glomak, the highest in Britain, the river plunging 370 feet into the chasm below, and of this over 300 feet is in sight at once, and as the river was in speat, a marvellous scene presented itself, the water from the great height being changed into snow-like spray, which ever and anon was swept upward again by the wind, or glistened into iridescence as the sun broke through the clouds. The rock surrounding the fair are singularly precipitous, at least 700 feet of cliff, black and naked of vegetation, without those ledges which give even to the gorge of Twl Dhu some aspects of tenderness. The only plants noticed near were *Sedum Rhodiola*, *Geranium sylvaticum*, Solidago and a few Hieracia, the prevailing feature being barren loneliness, the view down the gorge (in which sight of the river was soon lost) towards Glen Elchaig partaking of the same character; so that, compared with other falls such as Foyers, Moness, Corrymulzie or Bruar, it yields to them in the wooded cliffs, hung with ferns, mosses and lichens, which give them soft beauty, yet the sterner grandeur of the black mural precipices and the barrenness of its environments and the almost absolute loneliness and sense of isolation felt by the observer, all tend to make these Falls of Glomak most impressive.

LIST OF ASSISTING NATURALISTS.

Middlesex.

London.—W. J. V. Vandenbergh, V.-P. and Member of the Council, North Middlesex Nat. Hist. Assoc., 26 Ingleby Road, Grove Road, Holloway, N., and 77 Campsbourne Road, Hornsey. *General Zoology*.

Fungus (*Agaricus nudus*).—Will any of your readers who have experimented upon this fungus kindly say whether in their opinion it is an edible one or not? I am led to make this inquiry because my own experience is in direct opposition to the caution given in "Mushrooms and Toadstools" by Worthington G. Smith, Esq. Far be it from me to question the statements of such an authority, but I think the following facts are, to those engaged in the study of Fungi, of sufficient interest to be placed on record. Two or three months ago, I found, and ate, as did also two or three members of my family, considerable quantities of this fungus. Since then I have bought the above work, in which the writer cautions his readers against eating it. I communicated with Mr. Smith on the subject, who tells me he has "heard of persons being very queer indeed after a nudus." He does not, however, say if he has himself tried it. It is almost needless to add that I was quite unaware of any suspicion attached to it, and, as I have remarked, we ate quantities of it, and we thought it very little inferior to the common mushroom, the only objection was, that it was a little slimy, not unlike a Boletus.—*John Rasor.*

THE SQUIRREL.

THE squirrel (*Sciurus vulgaris*) belongs to the order of animals called Rodents, which order comprises nearly one-third of the mammalia. The squirrels in themselves are a numerous family, and are spread over almost the whole of the globe; the Javan squirrel (*Sciurus Javensis*) and the long-eared squirrel (*Sciurus macrotis*), inhabiting respectively China and Borneo, are among the most remarkable of the tribe. Our European squirrel is found plentifully in England and Scotland, but is not, I believe, known in any part of Ireland. Keepers generally consider this little animal as one of their greatest foes, and accordingly they shoot them whenever they have the chance, which, I am glad to say, is not so often as they perhaps wish, as the squirrel is a very cunning fellow, and when once shot at, or wounded, he will hardly give you a second chance. I once wanted a specimen, and going out into a well-known haunt, almost immediately got a shot at one, and wounded it slightly. A long time elapsed before I could get a second shot, as it kept dodging from one side of the tree to the other. Keepers destroy them, as they are said to suck eggs and carry off young birds, but I should think they very seldom manage to rifle a pheasant's nest. They are far more likely to suck the eggs of the carrion crow (*Corvus corone*), or the hawks *Accipiter nisus* and *Tinnunculus alaudarius*, as these birds build in trees. Squirrels also bite off the tops of young fir-trees in spring; this they seem to do from love of mischief, as you may frequently see the ground quite strewn with these tender tops. The squirrel has also other enemies, which, however, he generally manages to evade. Boys who work in the woods love to hunt squirrels in the winter and springtime, and in fact it is most exciting sport. I must own that, in former days, I have frequently indulged in it myself; though cruel, it is hardly as bad as fox-hunting, as the hunted squirrel far more often escapes than does the fox; he is driven from his nest

Fig. 45.—Common Ground Squirrel (*Tamias striatus*).

(or, as the country people call it, "dray," or "draw") by means of a long pole, and is then hunted from tree to tree, sticks being thrown at him but seldom with effect, as the branches of the trees protect him. Sometimes, instead of going back, no other tree being near enough to jump on, he will take a gigantic leap from the tip-top of the tree he is on down to the ground, and gallop away at great speed to the next tree. I have sometimes seen them bolt into a rabbit's burrow, and I once saw one driven out by a ferret; and while on the subject, I may remark that an old keeper once assured me that his ferret once drove a large cat out of a rabbit's hole; I have heard, too, of foxes being driven out of their holes by ferrets. I myself once saw a weasel rush out of a hole on the introduction of a ferret into it; it turned out, too, that Mr. Weasel had been feasting on a dead rabbit. No doubt he very much disliked going, but thought it only prudent. Squirrels are not very prolific animals; they have a set of about four or five young towards the end of April, and writers assert that they breed again in the summer. A fresh nest is made every year for the young, composed of sticks, chiefly oak twigs, then moss and leaves, and lined with dead dry grass; the young can easily be tamed, and are very tractable. I have always found the nests built in an oak or beech tree, between two large limbs, and sometimes in a low bush; but I believe that they sometimes build in hollow trees. I know of a wood in North Hants where squirrels are very abundant, and in some parts of this wood almost every tree has a nest; of course, most of these are old nests; in winter, squirrels frequently sleep in their old nests. I recollect once, on a cold nipping day (I believe it was Good Friday), finding three old squirrels all huddled up together in one old nest; the nest is not easily dislodged without coming to pieces. The squirrel, it appears, is a nocturnal animal, too; coming out both night and day. Country people in North Hants call this little animal "scuggie," in imitation, I think, of the harsh, loud cry they utter when annoyed. Mary Roberts (in "Annals of our Village") remarks that they will also, when pleased, utter a purring sound like that of the cat. I confess that I have never heard the animal utter this sound, either in a wild state or when in a cage. Cowper accurately writes of the squirrel:

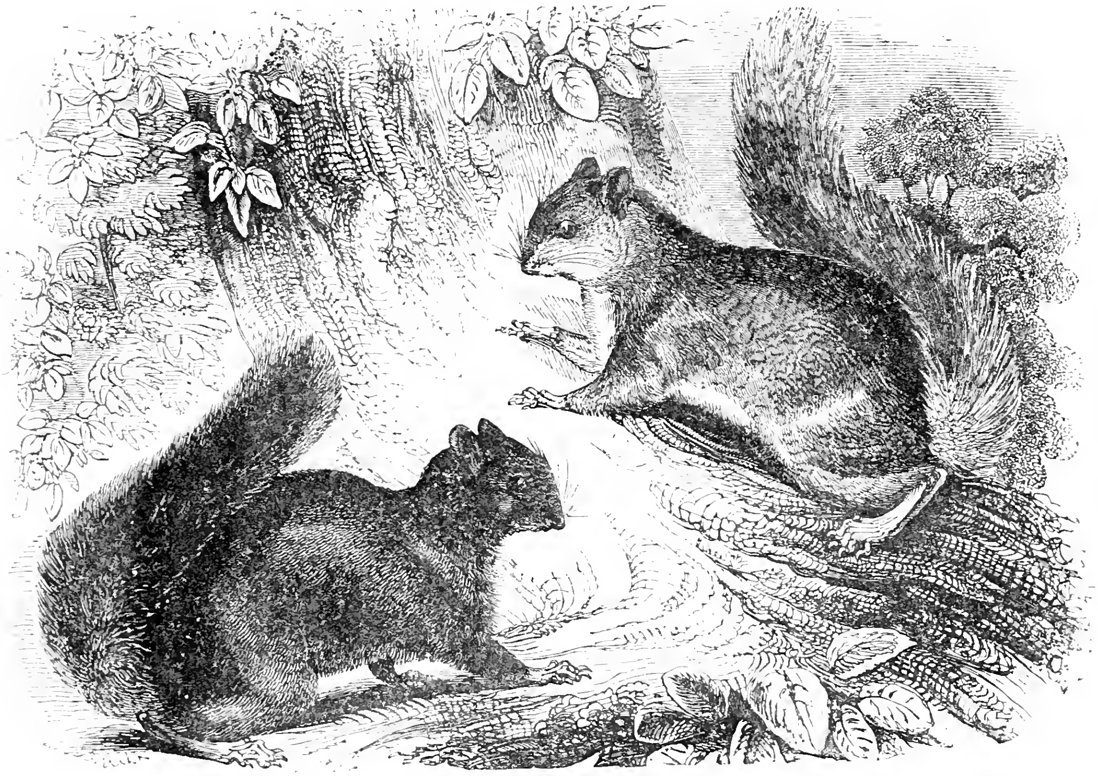


Fig. 46.—Northern Grey and Black Squirrels.

> "Drawn from his refuge in some lonely elm
> That age or injury has hollowed deep,
> Where on his bed of wool, and matted leaves,
> He has outslept the winter, ventures forth
> To frisk awhile, and bask in the warm sun,
> The squirrel, flippant, pert, and full of play,
> He sees me, and at once, swift as a bird,
> Ascends the neighbouring beech, there whisks his brush,
> And perks his ears, and stamps, and cries aloud,
> With all the prettiness of feigned alarm,
> And anger insignificantly fierce."

William Browne also writes an amusing account of a "Squirrel Hunt," in which he speaks of the "dray" of the squirrel. Squirrels sometimes, even in this country, have their coat of a much lighter colour in winter than in spring, and various piebald specimens are on record.

GEORGE DEWAR.

MICROSCOPY.

MICROSCOPIC ILLUMINATION.—I write to express my indebtedness to Mr. F. Kitton for his suggestion in your December number. I find the globe of water which he uses for an achromatic condenser fully to realise his description, and where there is a swinging mirror to answer the part of a swinging substage, carrying an achromatic condenser. I wish also to remove two difficulties in the way of such as are desirous of acting upon his suggestion. The first serious difficulty I found, was in obtaining such a globe—opticians and glass dealers could give me no help; at last an engraver gave me the address of Messrs. Gray & Son, Clerkenwell (close to the church), dealers in watchmakers' tools. There I found several sizes of globes in stock, and purchased one of $7\frac{1}{2}$ inch diameter. On mixing the copper sulphate in tap water, I found the liquid cloudy within a few hours of filtration. By the addition, however, of a few drops of pure sulphuric acid, the cloudiness was entirely removed, and the contents of the globe have been perfectly clear ever since.—*H. M. Stallybrass.*

HOW TO LABEL MICROSCOPIC SLIDES.—As little has been said of late about labelling micro. slides, may I be allowed to recommend a plan which I devised four years, ago and which I now use for the whole of my collection? Instead of one thin paper label at one end of the slide, I use two labels and make them of slips of thick card or millboard, 1 in. long by $\frac{1}{2}$ to $\frac{3}{4}$ in. wide. These may be covered with white paper, or the ordinary printed labels placed on them. If the cards are sufficiently thick the slides may be placed one against the other without fear of damage, for the glass of one slide does not touch the cell or cover of the next. Hence there is no need of a cabinet in which to keep the slides as any box of a suitable size will do. I use card boxes 3 in. deep, with one side to open; each box contains about two dozen slides, and is labelled at the top with the class of objects thus: "diatoms," "animal hairs," "geological," and so on. I have 400 slides labelled in this way, so I speak from experience. Of course slides so labelled *can* be put in cabinets of the usual kind, if necessary.—*G. H. Bryan.*

THE ROYAL MICROSCOPICAL SOCIETY.—Part i. of vol. ii. of the Journal of the above society, just published, contains papers by W. A. D. Michael, F.L.S., on "British Oribatidæ"; by Mr. T. Charters White, on "A new Growing or Circulating Slide"; and by Mr. W. H. Symons, on "A Hot or Cold Stage for the Microscope"; besides a copious and well-arranged summary of matters affecting microscopy, which is a new and improved feature of the new editorship.

CRYSTALLISED FRUIT SALT.—It may not be generally known to your readers that Eno's Fruit Salt, when crystallised, makes a magnificent polariscope object. The mode of preparation I have adopted is as follows: In a small test tube, say 3 in. × $\frac{5}{8}$ in., dissolve as much of the salt as would rest on a sixpence, by adding distilled water to the depth of an inch. With the end of a glass rod spread a few drops of this solution over an ordinary 3 in. × 1 in. glass slip, and in a few minutes crystallisation will take place. The slide is now ready to be examined under the microscope, and a selenite plate should be added; it will then be seen to be covered with numerous beautiful formations, each somewhat resembling a Maltese cross made up of brilliantly-coloured needle-like crystals. If the slide be held over the flame of a lamp as soon as the solution is placed on (so as to hasten crystallisation), the colours will be the more splendid without selenite. Other beautiful effects may be produced by the addition of a few drops of alcohol to the test tube. The slides, as soon as dry, may be mounted in Canada balsam. I trust many may be induced to try these simple experiments, and I can promise them a rich reward for their labour.—*George John Wightman.*

ZOOLOGY.

HOW DO EELS BREED?—In reply to M. N. N. G. C., I extract the following from "Blackwood's Magazine" for January, which seems to be pretty conclusive:—"Naturalists affirm" (says the writer) "that the eel deposits its spawn as other fish do, and state that the microscope reveals the presence of spawn and milt in the eel. This is so much opposed to all the statements and experience of eel-fishers and eel-setters, that we cannot accept it as a fact; and after listening to so many eel-fishers who stoutly affirm that they have constantly opened eels in February which have been full of minute living eels (not parasites), and that in a tub of eels young ones have been found in the morning that were not there over-night, we strongly lean to the theory that eels are viviparous. To use their own words, there are thousands and thousands of eel-fry all alive in the bodies of eels cut open in February. The young fry are contained in a membranous sac, as long and thick as one's finger, and the eyes and backbones of the fry are distinguishable. When the sac is cut open, the fry unbend themselves and wriggle about. Eels are found in this state during February, March and April." The fixed belief among a large number of Norfolk Broadsmen is, that eels breed upon the land, and subsequently take to the water. Others, more intelligent, believe that the young ones are produced in the rivers during the spring months.—*J. Ford, Wolverhampton.*

LOCAL NAMES.—(Kent), Song Thrush (*Turdus musicus*), "Gray-bird"; Long-tailed tit (*Parus caudatus*), "Bottle-tit"; White-throat (*Sylvia cinerea*), "Jolly White-throat"; Hedge Sparrow (*Accentor modularis*), "Hedge-poker"; Spotted Flycatcher (*Muscicapa grisola*), "Post-bird"; Pied Wagtail (*Motacilla Yarrelli*), "Peggy-dishwasher"; Green Woodpecker (*Picus viridis*), "Galley-bird"; Wryneck (*Yunx torquilla*), "Snake-bird"; Swift (*Cypselus apus*), "Screech-owl"; "Squeaker"; Jay (*Garrulus glandarius*), "Joy"; Red-throated Diver (*Colymbus septentrionalis*). Yarrell says this last bird is called "Sprat-loon" about the estuary of the Thames on the Kentish and Essex sides, in consequence of these birds following the numerous shoals of sprats.—*Henry Lamb, Maidstone.*

MOUNTING SHELLS.—A correspondent asks for information about mounting shells, and I offer him the following advice:—Do not employ card, which warps, but use wooden tablets. Three inches by two and a half is a convenient size for a large number of shells, if it is not wished to exhibit more than two specimens. Let the wood be well seasoned, and cover it with paper. Dull greyish-blue is a nice colour. Use paste or gum for applying the paper, and let the tablets dry under pressure, or blisters will arise. A collection looks pretty if the specimens are gummed upon plate glass. Both sides of the specimens can then be seen. The glass should be laid on coloured paper. Large shells are best not mounted, but laid on cotton wool in cardboard trays; and all minute and very delicate species should be exhibited in glass-topped boxes. The former should be first mounted on slips of cardboard, and then raised on cotton wool.—*W. C. Hey, Curator of Conchology, York Museum.*

PESTS OF THE BEE-HIVE.—I may inform Mr. J. A. Smith, my experience as a bee-keeper, extending over nearly twenty years, is somewhat similar to his own. I once found the nest of a mouse, containing four blind young mice, in the corner of the straw skep; and when I examine the straw hives of my farm friends, early in the winter, I seldom fail in finding two or more queen wasps, near the crown of the hive, under the cover, amongst the straw. The fact of finding a humble-bee's nest in contact with the hive is, however, a new experience, though I have ejected a large colony of wasps from beneath the bee-bench. I felt grateful in reading your correspondent's notes, for anything having reference to bee-keeping has an especial interest to the author of —"*British Bee-Farming.*"

"SYMBIOSIS."—This is a term recently coined to express the mutual relation between certain vegetables and animals. The green colour of the sea anemone (*Anthea viridis*) is largely, if not wholly, due to the presence of green unicellular algæ enclosed in the cellular structure of the outer tissues. A large number of animals—Radiolarians, sea anemones, corals, jelly-fish, &c., have been found to have green or yellow algæ thus imprisoned in their tissues. Mr. P. Geddes has shown that all these algæ have a distinct life and death and method of reproduction of their own; that they secrete starch, and give out oxygen, at the same time removing the carbonic acid of the animals. By giving out oxygen, they are of much service to the animals they affect.

BOTANY.

THE GLASTONBURY THORN is a variety of the *Cratægus oxyacantha*, or white thorn. This variety is remarkable, as alleged, for flowering on Christmas Day, and as some say—in the county of Somerset—old Christmas Day. There are a number of curious legends connected with the appearance of this thorn, the principal of which is that it was derived from the walking-stick of Joseph of Arimathea, who is said to have planted his staff on the site of the old abbey at Glastonbury. Now as I have a tree said to have been derived from this thorn, it may be a matter of interest to note that in a period of eighteen years this thorn has flowered three times in winter, and that this year I had the pleasure of examining some fine flowering specimens of the plant on Christmas Day, and again on old Christmas Day were gathered some fresh flowers, while that of the earlier date was well set in fruit. The truth is, that this tree in my shrubbery usually flowers and fruits twice in each year, but it is very irregular as to date. Indeed, it may be concluded that the white thorn is subject to considerable variations. I have gathered samples from a hedge at Alfrick in full leaf on Christmas Day, and I have seen that in rows of thorns some one or two will be in early flower when the rest have remained weeks behind.—*James Buckman, Bradford Abbas.*

PRESERVING FLOWERS.—For preserving the colours of parts of flowers which it is desired to mount for the microscope, I find a saturated solution of the ordinary potash alum (crystallized, i.e., $Al_2\ 3SO_4$, $K_2\ SO_4$, $24\ H_2O$) most excellent. I allow whatever I require to manipulate with to remain in the liquid for ten minutes or so, and then dry it between bibulous paper, place it in turpentine to render it transparent, and mount with balsam. I have a portion of the vexillum of *Ulex Europæus* mounted without the slightest appearance of that reddishness which accompanies specimens mounted in the ordinary way; and also I have the stigma of *Crocus sativus* as full of colour as it was before manipulation. I believe botanists would find this mordant invaluable, it being so cheap, its use so simple, and it can be had of any pharmacist. I presume your correspondent has rendered cupric sulphate, mentioned in Mr. Kitton's communication, by sulphur chlorate, a non-existing body.—*George Stocker.*

NUT TREES.—The Common Nut (*Corylus avellana*) has this year shown some odd vagaries in regard to flowering. As early as October several trees were hanging forth their full blown catkins, but though these were most abundant the female flowers were difficult to find at all. So up to the present time nut trees come into flower one after the other, and at the present moment there will be found in every hedgerow many nut trees in which the catkins have scarcely begun to expand their flowers. Never before have I observed such an amount of irregularity in the flowering of a plant which is usually very regular in this respect. The flowering of the nut this year, whether early or late, is very abundant in as far as the male flowers are concerned; but it has yet to be seen whether the female flowers will be equally abundant.—*James Buckman.*

BUXUS SEMPERVIRENS.—M. Guizot, in "Alfred le Grand" (Paris, 10th ed. p. 14), after a quotation from Asser and referring to the subject of his memoir, says: "Il naquit en l'année 849, dans la demeure royale de Wantage, au milieu des forêts du Berkshire *où abonde le bui.*" Although the statement which I have emphasised by the use of italics, is in the present tense, it would seem to me more reasonable to suppose that it has reference to the period of which the author wrote, than to the time when it was written, and if this supposition be correct, the inference is, that he derived his authority for it also from Asser. Possibly some of your readers, who have access to "De Rebus Gestis Alfredi," may be able to say whether any reference to the box appears in that work, as if so, it would be strong evidence in favour of its being indigenous in Britain.—*Thomas Dennis, Hull.*

YORKSHIRE PLANT NAMES.—The following is a list of Yorkshire plant names now in use in the vicinity of Whitby. "Bairnwort" or "banwood," the common daisy (*Bellis perennis*); "boretree," the elder (*Sambucus nigra*); "buns" or "bunnons," the cow-parsnip (*Heracleum sphondylium*); "cathaws," the fruit of the hawthorn (*Cratægus oxyacantha*); "catwhin," the dog rose (*Rosa canina*), the fruit of this plant are called "cattijugs;" "cheesecakes," the bird's-foot lotus (*Lotus corniculatus*); "cup rose" or "popple," the red poppy (*Papaver rhœas*); "foalfoot," the coltsfoot (*Tussilago farfara*); "gowland," the corn marigold (*Chrysanthemum segetum*); "ivin," the ivy (*Hedera Helix*); "sea-tang" or "tangles," the common marine plant *Laminaria digitata*; "segums," the ragwort (*Senecio Jacobæa*); "sour dockens," the common sorrel (*Rumex acetosa*); "whin," the furze (*Ulex Europæus*); "yakerons," acorns, the fruit of the oak (*Quercus pedunculata*).—*T. P. Deotchon.*

GEOLOGY.

VEINS AND CLEAVAGE.—Mr. Malet, in his courteous remarks on "A Visit to a Welsh Stone Quarry," differs from me as to (1) the mode of filling of the veins, and (2) the origin of cleavage. In his opinion (1), the quartz veins were filled by a cold solution of silica percolating from above, which silica was derived from the mass of mud that formed the rock. But I think there is no evidence of even a moderately concentrated cold solution of silica in nature; on the contrary, we have hot solutions of it in the geysers of Iceland, the hot springs of California, and elsewhere. Professor Arthur Phillips states that in the Steamboat Springs of Nevada the silica shows the ribbon-like structure so common in lodes; in fact, these and other springs are examples of mineral veins in process of being filled, and greatly strengthen the hypothesis that most lodes have been filled from below by hot mineral solutions.* I am aware that many smaller veins—as those of calcite in limestone rocks—have been filled in by percolation from above and from the sides, but as the quartz veins mentioned in my paper occur in the neighbourhood of lodes, I suppose them to have been filled in a similar way to the latter.

Let us now turn to (2) the more important subject of cleavage.† According to Mr. Malet, a cleavage-plane is merely the greater or less separation of two contiguous lines of particles or "fibres," which separation is produced by what may not be inaptly termed a process of simple desiccation. The following is Mr. Malet's starting-point:—"Atoms, when subsiding in water, become correlative to its force, and settle down in every line, from horizontal to vertical, under their own power of gravitation in still water, or under the power of any force capable of acting on them in water that has motion."‡ The microscope negatively disproves this assertion; it shows no evidence of any such fibrous arrangement of particles; on the contrary, a thin section of shale is seen by it to be made up of particles of various sizes and shapes, with their longer axes placed at every conceivable angle. But slate—which was once shale—*does* show a rough parallel arrangement of particles, the longer axes have, as it were, been turned so as to point all one way. This structure has clearly been developed since the slate was in the condition of shale, and most geologists say

* See Prof. Phillips' "Contribution to the History of Mineral Veins," Quart. Journ. Geol. Soc. vol. xxxv., 1879, p. 390, *et seq.*, and Mr. Laur, "Annales des Mines," 1863.

† Through Mr. Malet's kindness, I have been able to refer for details of his theory to his own very interesting work, "Incidents in the Biography of Dust."

‡ "Biography of Dust" p. 241.

it has been produced since the hardening and contraction of the rock—for there are hard rocks which do not exhibit a trace of cleavage, although in other respects the same both chemically and physically as clay slate—by intense and long-continued mechanical pressure acting at right angles to the cleavage Professor Tyndall has shown that pressure, and Mr. Wear Fox that electricity * can be made to produce lamination precisely analogous to cleavage. Magnetic currents may have helped the particles in nature to assume this definite direction. The course of the cleavage in N. Wales seems to lend probability to this view; it strikes N.E. and S.W., the former direction of the magnetic currents in this globe, or at right angles to the direction of the mighty pressure forces which have acted from the N.W. and S.E. The combined action of pressure and electricity should be tried on a lump of clay, and it should be ascertained whether mere pressure on such a mass be capable of producing electrical currents at right angles to the direction of the pressure force applied. Even supposing that the particles were deposited in lines in the first instance, would not subsequent contraction speedily efface such an arrangement? The mechanical pressure theory is supported by the following general facts taken from nature, and I fail to see that Mr. Malet's view satisfactorily explains any one of them. 1. In South America cleavage is to be seen remarkably parallel over hundreds of square miles of area (Darwin). 2. Where cleavage is distinct, stratification is obliterated. 3. The fossils and nodules of cleaved rocks are greatly contorted, such rocks exhibit mighty folds, and quartz bands in them have been squeezed to a serpentine form into a space one-fourth their former length. 4. The strike of cleavage runs in the same direction as the general lines of elevation. 5. Strata showing cleavage are often curved, while the planes of cleavage are perfectly straight and parallel, and cross the planes of stratification at all angles. 6. The Silurian strata of Wales have been violently contorted and cleaved, while the same formation in Russia is perfectly horizontal, exhibiting no trace of cleavage. 7. Cambrian conglomerates near Llanberis are all placed with their longer axes in a direction parallel to the planes of cleavage, and make high angles with the planes of stratification. (Ramsay.) I do not think it has been shown by observation or experiment that simple contraction—i.e., contraction by drying—will produce cleavage. The cracks seen in dried mud and slime deposits cross each other at many angles, cutting up the mass into rough prismatic masses, and they can only be compared to the joints of sedimentary rocks. Some geologists suppose that the lateral pressure which produced cleavage was caused by the contraction of the earth's crust through the radiation of its heat, but this explanation is open to grave doubts. We can only judge of unknown forces by the effects they have produced. This force—although it may no longer be in action—has left a language inscribed on the rocks, in no hazy characters, by which it tells us of its past reign, just as hieroglyphics point back to a mighty dynasty long since overthrown!—*E. Halse, A.R.S.M.*

* For the method of producing lamination in clay by voltaic action, see Report of Royal Polytechnic Soc., 1837, pp. 68, 69.

A "MISSING LINK."—Professor Cope has just described in the "American Naturalist" the occurrence of remains of an anthropomorphous Lemur. Professor Cope has named it *Anaptomorphus homunculus*. He says the genus is nearer the hypothetical lemuroid ancestor of man than any yet discovered.

FOSSIL REMAINS IN THE HOLLOWS OF FOSSIL TREES.—Professor Dawson, the well-known Canadian geologist, has communicated to the Royal Society a most interesting account of some explorations in the coal formation of Nova Scotia. A large number of erect fossil trees, chiefly those huge extinct club-mosses called Sigillaria, were found, measuring about three feet in diameter. These trunks had evidently been hollow before they were fossilised, for in their interiors was a quantity of earthy and vegetable matter, crowded with the bones of small reptiles, land-snails, and millepedes. It is presumed that these creatures must have sheltered themselves in the cavities. Professor Dawson gives an account of twelve species of batrachians whose bones were obtained. About half of the fossil reptilian remains are new to science; and many of the fossil insects are also believed to be new species. Fifteen hollow trees were examined, and found to contain fossil remains.

NOTES AND QUERIES.

SWALLOWS' NESTS.—In the parish of Hartley Westpall, North Hants, there is a cottage situated in a meadow, it is some fields distant from any other dwelling. At one end of the cottage is a shed, used as a wood-house; on a nail in the wall was suspended Mr. Gillett's hand-saw, and on the top or end part of the handle a pair of swallows stuck their nest. On the children communicating the fact to their father, he with a commendable, an exceptional regard for the feelings of his feathered friends, enjoined them not to molest the birds; and as I was then the master of the school which the boys attended, but which I have since been compelled to leave through the intrusive interference of a person, I also gave them similar advice. When the bird had laid her eggs I went to look at them. The saw was taken off the nail, and carefully held to prevent the eggs from falling out. Having looked at the eggs I hung up the saw again, and waited in the garden to watch the movements of the birds. They flew round very near the shed, but did not enter. One of the children then told me, that as I had left the door open the birds would not go in, as they liked to fly in over the top of the door, where was a little opening. The young brood was reared; but as I left the neighbourhood, I have not heard whether or not a second hatching occurred. Subsequently to the incident named, a pair of swallows (not martins) built a nest in the porch of my school, about ten feet from the ground. They did their work in the mornings before school began and after it was closed, but in the time of incubation they became less timid, making their ingress and egress in my presence. Of course the boys evinced the common propensity for destroying the nest, but I practically illustrated the Inspector's Report that my "children readily obeyed orders," by mildly and kindly inducing them to refrain from annoying the birds in any way. In all probability it was the first time in their lives that they were prevented from gratifying the prevailing desire to destroy whatever a bird has built.—*J. W. Batchelor.*

SWALLOWS' NESTS.—I saw a notice in SCIENCE-GOSSIP from one of your correspondents about swallows building their nest over a doorway in a much frequented place; a similar case occurred here this last summer. A pair of swallows built their nest over the front door of my house, inside the porch. There are glass doors to the porch, and these are shut every evening at dusk and not opened till about seven o'clock in the morning. Some of my family generally sat in the porch when the evening was fine, or of a wet day when they could not go out, but it made not the slightest difference to the swallows, they were constantly flying in and out; and when the young ones grew strong we could hear, as we sat in the dining-room, their cries as the parents came in with food. I sometimes got up early to liberate them, and found them flying about in the porch. For some time the whole family came home every evening, and when they grew large and could not all fit in the nest, the old ones sat on the lamp hanging from the roof of the porch. It was very amusing to see them arranged for the night, the four little white breasts all in a row, sitting on the edge of the nest; the whole thing was a source of great amusement to us, and if all be well, we hope they may come again next year to the same place. A flat piece of virgin cork, fastened under the nest, prevented all nastiness.—*W. R. T.*

NOTES IN CHRISTMAS WEEK, 1881.—As we had frost throughout the greater part of December, the effects of the mild weather which set in on Christmas Day, and lasted to the end of the year, must be thought a little remarkable. Here the primroses have been flowering in the hedgerows. A single primrose plant, in a bleak spot exposed to the north, bore three flowers between the 20th and 31st, and has at least five buds yet to open. I was told of another plant nearer to the mountains. I also found, on the 31st, blue milkwort, both dark and light, on a bare hedge-bank without shelter; even hardier specimens than the plant which astonished some of your correspondents last year by flowering in April. I noted the bramble in blossom—December 25th—the common centaury and feverfew (*M. inodora*), December 30th; and the field madder, field woundwort (*S. arvensis*) and mouse-ear chickweed (*C. vulgatum*), December 31st. The wild flowers to be seen throughout the week were: the common furze and the Irish furze (*U. Gallii*), ox-eye daisy, barren strawberry, scented coltsfoot, field speedwell (*agrestis*), charlock, buttercup (*repens*), ragwort, hawks-beard (*C. virens*), and nipplewort; with, of course, the daisy, dandelion and groundsel. Adding all my wild flowers of Christmas week together, the sum turns out to be twenty-two species. We had roses in the Christmas decorations in the parish church of Killanne; hollyberries I do not remember to have seen in such clusters in any winter. In our own garden the flowers of the season are roses and violets, periwinkles, pansies, veronicas, wallflowers, snap-dragons, polyanthuses, primroses, and barberry. Had I kept a stricter watch throughout the week, I should probably be able to mention others, both wild and garden flowers. With respect to violets, the Poet Laureate sings of the maiden who had feared—

> "To die before the snowdrop came,
> And now the violet's here."

As the violet with us invariably blooms before the snowdrop, the last line scarcely conveys the climatical impression that seems to be intended. The missel thrush sang every day in Christmas week. On the 31st I heard a chaffinch striking up its lively ditty; and at noon the same day I had the still greater pleasure of hearing a golden-crested wren merrily singing "the old year out." To these remarks I must add, that a lady friend heard a song thrush pursuing its professional practice the same day; and she also tells me that on the 27th of the month she saw the wood loosestrife (*Lysimachia nemorum*), better known here as the yellow pimpernel, showing its pretty blossoms.—*C. B. M., Co. Wexford.*

MISCELLANEOUS NOTES.—Early in last season I killed a very large wasp; later I killed a very small one, the only two I have seen all the season. It is said, a plum year a wasp year. Some years I have had about two bushels of plums off some of my plum-trees, this year on the same trees I counted seven plums. Plums with us have been very few, mulberries scarce, hollyberries in abundance, haws plentiful, but the storm on Oct. 14th blew many down; under one tree they could be swept up, which will account for there not being so many left. If the abundance of haws and hollyberries foretell a cold winter, we must expect a very severe one. I have noticed but few caterpillars this season, and then only single ones, not in clusters as some kinds do. I can only account for this by the heavy rains and winds; we had some on the gooseberry and currant bushes, but by shaking them well and then dusting them well with lime, so as not to injure the fruit, and dusting the ground, we soon got rid of them. If the lime does no other good it manures the ground. I have noticed the rose leaves cut in many bushes this year, by the rose-cutting bee; I have heard it remarked by others. The storm on Oct. 14th was dreadful. It blew down in my orchard one large apple-tree entirely, the half of a walnut 112 years old, about a fourth of a mulberry-tree more than 100 years old, large limbs of trees scattered in all directions, large willows in the marshes opposite and other damage. The destruction of these old trees shuts off from the birds, shelter and places to build their nests, the same in grubbing up the shrubs and cutting down the trees destroys their places of resort; not only that, but it prevents the insects and other creatures that form their food from having places to multiply in. Thus we may profess to wonder at the scarcity of the golden-crested wren when the firs are cut down, under the boughs of which they build their nests, the wryneck or snake-bird, and many others. The same course has been going on with the river, the ditches filled up, the marshes drained, alders, willows and osiers cut down; rushes, reeds and long grass dried out; grass and vegetables grow now for cattle and man; we cannot have it every way; the water birds shut out and destroyed, we still see the beautiful kingfisher, but alas it is scarce. The fishes again—the space for them to live and breed in is curtailed, besides (as in the case of birds) the places for their food to multiply in are closed against them; the minnows are now very scarce here, the numbers of the beautiful trout have dwindled down to a minimum; eels, where at one time might be caught 5 cwt. alas now where are they? The dreadful tornado we had on Friday, October 14th, may frighten the timid and superstitious, but accounts state that for the last 1480 years earthquakes lightning, storms, hail, snow, fogs, &c., have been going on. As I must be brief, I will quote a few out of the multitude of meteorological extracts that I have before me. In 401 the Black Sea was entirely frozen over. In 800 the winter was intensely cold. In 1213 the Po froze 15 ells deep, and wine burst the casks. The successive winters 1432, 1433, 1434, were uncommonly severe: it snowed 40 days without interruption, all the rivers of Germany were frozen, and the very birds took shelter in the towns; the price of wheat rose in England to 27 shillings a quarter, but was reduced to 5 shillings in the following year. In 1716 the winter was very cold; on the Thames booths were erected and fairs held. The hot summers appear to have been as hot as the winters were cold. In 763 the summer was so hot that the springs dried up. In 1333 the cornfields and vineyards were burnt up. In 1556 the drought was so great that the springs failed; in England wheat rose from 8 shillings to 53 shillings a quarter. The year 1788 was also very hot and dry, and of the same character was 1811, famed for its excellent vintage and distinguished by the appearance of a brilliant comet. It is therefore evident from these accounts that the summers were much hotter and the winters much colder than at present. To be brief, the number of earthquakes, eruptions of volcanoes, destruction by lightning, winds, floods, &c., I cannot now go into. We may easily perceive that Nature never stands still, that all these forces are constantly at work, that the earth's surface must be materially altered in hundreds of thousands of years, and that the globe itself may change its position, and then where will Old England be?—*Thomas Kingsford, Canterbury.*

THE MILDNESS OF THE SEASON. — Strolling through Norwich cemetery to-day (Jan. 12, 1882), I observed the following plants in full bloom: Virginian stock (in abundance), roses, marigolds, and white arabis, also *Ranunculus bulbosus*, *Achillea millefolium*, *Veronica Buxbaumii*, *Lamium purpureum*, *Capsella bursa-pastoris*, *Senecio vulgaris* and *Stellaria media*. I also noticed in adjoining gardens yellow crocuses, snowdrops, winter aconites, primroses, pansies, Sweet Williams, mignonette, stocks, wall-flowers, Christmas roses, and yellow jessamine in flower. Hazel catkins were fully expanded, and lilacs, honeysuckles and blackthorn were in some places showing their leaves.—*A. W. Preston.*

TADPOLES IN OCTOBER.—I remember finding several small newts with well-developed branchiæ in mid-winter, December (I think) some years ago. The weather had been mild. I have now a newt (1½ in. long) which has been kept in a jelly glass for four or five months and still retains his branchiæ, though much diminished. These he has probably been unable to spare on account of the depth of the glass, and having no weeds to support him in breathing at the surface of the water.—*W. B. R.*

ORNITHOLOGICAL NOTES.—I think the following ornithological notes may prove interesting: as a proof of the mildness of the season, the following birds have been singing here at the undermentioned days in January. Common thrush, 2; missel thrush, 7; great tit, 11; skylark, 17; redbreast, 18; gold-crested wren, 23; nuthatch, 28. Near this place is the finest old English poplar I know of; it is in my estimation sixty feet in height. Remarking to an old labourer the other day how valuable it would have been for wheelwrights' work a few years since, he surprised me by replying that when a lad he had heard his father say a pair of ravens built in it annually, and its owner had the bole spiked, to prevent boys from climbing to their nests. Within a quarter of a mile of my residence, a small colony of rooks took possession of three young oak timbers early last spring, and built twenty-two nests. On April 18th matters appeared to be going on as usual, but on the 20th every rook had finally disappeared. Now, considering the young must have been hatched, this appears to me rather unaccountable. I once detected a stoat at a pigeon's nest in a tree twenty-feet from the ground, but the rook-trees were at least fifteen feet higher. The owner of the trees did not wish to have the birds disturbed, and is very strict with trespassers. One of my labourers tells me that several years since he was engaged in hoeing corn near some rook-trees, when a pair of "large" hawks appeared on the scene and worried the rooks until they forsook the place; the hawks then reared their young in one of the deserted nests. A pair of either kestrel or sparrow-hawks did breed near the first-named three trees in 1880, but not that I am aware of in 1881.—*E. Lingwood, Thwaite, Stonham.*

FLUKES IN SHEEP.—Helen E. Watney's note in the December number of SCIENCE-GOSSIP, correcting her first note on flukes in the November number of the same, requires a slight correction, for, as it stands, it is misleading to the uninitiated. Instead of "effect" the word "begin" should have been used, because the fluke only begins its various changes in the world and effects or completes them in the liver of the sheep, and when the matured fluke is taken out of the liver it cannot be kept in water, but immediately dies.—*Clara Kingsford, Canterbury.*

HERONS.—*A propos* of the note by F. J. B. in your January number, I would quote the following from Waterton's essay on the Heron (Essays, first series, 6th ed. p. 187).—"There is an old and vulgar notion, still current here (in Yorkshire), that, when the heron is sitting on her eggs, her legs appear hanging down on the outside of the nest. Probably the length of the heron's legs has given rise to this absurdity. A very slight inspection of the formation of the bird would suffice to convince the observer of his error. The thighs of all known birds are of a length exactly proportioned to that of the legs; therefore when a bird wishes to place itself in a sitting position, the bending of the knee causes the leg to recede sufficiently towards the tail to allow the feet to come to the centre of the body. This being the case the heron places its legs in the nest with as much facility and ease as all other birds place theirs. Indeed, it cannot possibly perform its incubation with its legs outside of the nest; and the admirable provision of Nature, in always giving to birds a due proportional length in their legs and thighs, saves the heron from the necessity of attempting to place itself in such an unsightly posture. In fact, the formation of the parts would not admit of it; and were a bird by any chance to put itself in a position by which the legs would appear on the outside of the nest, we may rest assured that both great pain and great inconvenience would ensue, and soon force it to resume the common process of incubation. The thighs by being stretched asunder, would be thrown out of their ordinary bearings; and the feathers by coming in contact with the outer materials of which the nest is formed, would be forced into a direction quite opposite to that which they have received at the hand of Nature. Hence we may safely conclude that neither the herons, nor any other birds of the creation, ever perform their incubation with their legs on the outside of the nest."—*E. A. F.*

VIPER AND NIGHTINGALE.—In one of the early volumes of SCIENCE-GOSSIP, which I do not possess, there is a short note referring to a certain wood in Hampshire, where the nightingale is never known to sing nor the viper to sting. Would some obliging correspondent kindly copy the above paragraph and forward it to the undersigned, or send it as a note to SCIENCE-GOSSIP?—*W. H. Warner, Standlake, Witney, Oxon.*

WHITE SPARROWS.—I beg to say that they have been observed here, more than once, with white feathers in their wings.—*Paddockwood, Kent.*

WHITE SPARROWS.—On the 29th of January, this year, I saw a sparrow with one wing quite white, in the neighbourhood of Reading. In the early part of January, I also saw a sparrow quite black in the neighbourhood of Lewes (Sussex). In the "Field" of February 4th, two varieties of the house sparrow are reported, one cinnamon and one black.—*X. Y. Z.*

WHITE SPARROWS.—Seeing in the February number of SCIENCE-GOSSIP a query respecting sparrows, I send the following for inquirers' information, and for others whom it may interest. Last summer at Leamington, I saw a white sparrow fly over the river Leam several times, and have also seen one or two in the neighbourhood of Birmingham and Wolverhampton. I see in White's "Natural History of Selborne," it mentions that white birds of British species are not uncommon. He says, "there was a white lark shot in the neighbourhood of Kingston Rectory, near Canterbury, in October 1828." In the "Natural History Magazine," there is a notice of a blackbird's nest, found at St. Austell, Cornwall, containing two birds, one of them perfectly white. In the summer of 1831, a blackbird's nest was found at Newbottle, near Edinburgh, containing four young, two of which were of the ordinary colour, and two perfectly white. On the ground of Doumsheugh, the property of Sir Patrick Walker, there was, some years ago, a beautifully mottled blackbird, which became so tame that it fed along with the domestic fowls. It continued there for some years, and was shot by a gentleman, who supposed it a bird of some very uncommon species. We have seen white crows very often; a white robin with red eyes, a white sparrow, and a white jackdaw.—*H. S. J.*

SPARROWS.—In answer to C. Kingsford's inquiries, we have seen sparrows here, occasionally, with white feathers in their wings, and saw one a few days ago. We had also, for two or three years, a blackbird with white feathers in one wing.—*Eleanor Snell, Blackheath.*

WHITE SPARROWS.—In reply to Miss Kingsford's query in your last issue, I beg to state that I have frequently seen about here (Lincoln), house sparrows, having white feathers in their wings.—*G. H.*

NOTES ON THE ARBUTUS.—Will Mr. Cundall excuse me if I ask him whether he means *Arbutus unedo*, which grows near Bristol, and is it found there wild? My reason for asking is because I find the common briarberry (*Arctostaphylos uva-ursi*) is called by some botanists an Arbutus. I am much surprised to hear that Unedo is found near Bristol, that is, presuming it grows wild. I have been frequently assured that it is not found anywhere else, of spontaneous growth, except in Kerry; moreover, I am confirmed in this statement by Hooker, who mentions only "woods at Killarney, Muckross, and Bantry." He says Arctostaphylos has the characters of Arbutus, so I suppose they might be easily mistaken for each other.—*John Rasor.*

"EYE-STONES."—Can you give me any information as to the source of the "Eye-stone," used in Guernsey as an agent for extracting foreign bodies from the eye? It is the operculum of a shell. The specimens I have are about a quarter of an inch in diameter.—*W. H. Sunley.*

WHITE HEATHER.—I have in my possession a sprig of white heather, which I found last summer, growing among cranberries on the summit of Meigle Hill, Selkirkshire. There were only two or three bunches on the spot. I have not seen the white variety anywhere in this district, excepting in this particular place; although I have frequently come across it in Inverness-shire, and other parts of the north of Scotland. The white heather is thicker in the foliage, and has fewer blossoms than the common kind.—*John G. Sharp, 6 Roxburgh Place, Galashiels, Selkirkshire, N.B.*

IRISH SUPERSTITION RESPECTING EELS.—The belief is not yet extinct among the lower classes of the population; though, thanks to the march of intellect, not so current as formerly, that the eels which abound in our lakes and rivers are the lineal descendants of the serpents upon which St. Patrick, according to an old legend, served a writ of ejectment, depriving them of any local habitation on dry ground. I have several times met with old people who believed this as firmly as any article of their religious creed.—*J. H. H.*

DIGITALIS PURPUREA.—A friend of mine saw in Buckinghamshire last year (1880), what appeared to be a form of the foxglove; the formation was just the same, only instead of having purple flowers, it had white ones, curiously spotted with yellow. He tells me he frequently saw them perfectly wild in fields and in hedge-bottoms.—*Alfred Waller.*

SCARCITY OF WASPS.—My experience in this locality (Fermanagh) corroborates that of a number of correspondents in various parts of the kingdom, as to the unusual scarcity of wasps. I think I did not see half a dozen during the whole season, while in some years they are to be encountered in such numbers as to amount to an almost intolerable plague.—*J. H. H.*

LARKS AND TOADS.—Dr. Warburton, in his note on the passage in question, says that the *toad* having very fine eyes and the *lark* very ugly ones, was the occasion of a common saying amongst the people that *the toad and lark had changed eyes.* Johnson refers to the rustic rhyme:

> ". . . . to heaven I'd fly,
> But that the toad beguil'd me of mine eye;"

and he says that the sense is, "the lark, they say, has lost her eyes to the toad." Mason reads *changed*, which appears to make better sense.—*H. Astley Roberts, B.A.*

CURIOUS FROGS.—About three years ago I caught by the side of a gushing mountain stream in Wales, a small frog, about 2 in. long, whose upper surface was a very bright vermilion, and beneath it was a pure milk-white; it had none of the markings of the common frog; it clung to a single rush-stem as easily as a grasshopper, and when my hand approached to take it, it with marvellous agility sprang to another. I kept it for several days, and fed it on worms and flies; it unfortunately escaped. Is this a variety, or a distinct species? A few months afterwards, I caught in a pond on Tooting Common a frog, twice as large as the largest of the common sort, and enormously fat, not only in its body, but in its limbs, down to its very toes. Above, it was a reddish-brown, very dark, with numerous spots; beneath, it was white, with a green tinge at the roots of the legs. The end of its body was not pointed, as in our common frog, but was rounded, in conformity with the rest of its body. It seemed extremely weak, falling over at every step. It (apparently) died after a few days, as it lay in the same position, and when taken up, hung limp and dangling. After about five days, however, the supposed corpse crawled to a saucer of water more vigorously than before its apparent death, but a relapse came, and during my absence it died really, and on my return was too much decomposed to allow of preservation. Could this be the great frog of Pennant?—*H. C. Brooke.*

BIFURCATION OF FIR.—In some districts, as at Saunderscount, Wexford, this is very common. It is due to two different kinds of worms, or rather, I believe, caterpillars, one kind boring into the pith of the sprout, and the other circling round it; but both killing the sprout, which is replaced by two or more stems. Where these caterpillars are very common they prevent the tree growing, up and it becomes bushy.—*G. H. K.*

WHITE ORCHIS.—If the writer of the note on white-flowered specimens of *Orchis morio* will forward me his address, I may be able next season to send him a specimen, as, though far from common, it is still not really a great rarity here.—*R. F. Towndrow, 2 Commercial Buildings, Malvern Link.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

C. F. WORTERS.—Your fossils are both of them the basal remains of sponges. No. 3 is partially converted into Chalcedony.

M. HUCKLEBRIDGE.—On the Mediterranean coast the only book necessary is Wood's "Tourists' Flora;" in fact, it answers for other parts of Europe, besides Spain, and we recommend it strongly. You may procure a copy from Mr. Wheldon, bookseller, Lincoln's Inn Fields, London. It was originally published by W. Pamplin; probably this veteran botanical publisher may still have copies on hand.

H. LAMB (Maidstone).—Many thanks for your valuable suggestion. Perhaps you will commence them?

J. H. WILSON.—The fungus is the pretty *Peziza carminea*, not uncommon in damp old hedgebanks, growing on rotting sticks.

W. H. W.—"Natural History Notes" is published monthly, and may be had of the Editor, 42 Loftus Road, Shepherd's Bush, London.

J. H. SANDERS.—Unfortunately your bottle was smashed in transit, but we should judge the insects to be thrips from your description. Mount in glycerine.

M. BATHAC (Homburg).—If you have carefully read the two articles on the "Early History of the Diatomaceæ" you will see that Mr. Kitton is giving M. Corda's ideas of Diatomaceæ—not his own—the ideas which were held concerning them forty years ago. There is no doubt as to their botanical character nowadays. See article on "The Natural History of the Diatomaceæ" in SCIENCE-GOSSIP for December 1880.

PISCATOR.—Your shells are *Ianthina communis* and *Littorina rudis*, the latter covered with a sponge called *Leuconia nivea*. Wood's "Common Objects of the Seaside," price 3*s.* 6*d.*, and J. E. Taylor's "Half Hours at the Seaside" (both illustrated, the latter containing nearly 200 woodcuts, price 4*s.*) would answer your purpose. Gosse's "Marine Zoology" is a somewhat advanced book, giving technical descriptions, but there can only be one opinion of its high value.

A. SMITH.—The fungi were quite flattened by being simply pressed between the sheet of paper, but we have little doubt they were *Nectria cinnabarina.*

J. H.—We are not aware of any book specially devoted to the "Plant Lore" of Shakespeare: but you will find all his plant-names in Prior's "Popular Names of British Plants."

W. W. W.—Your insect did not reach us. Are you sure it is not the Lepisma?

"LOO."—You will find the habitats of *Drosera rotundifolia* given in Roper's "Flora of Eastbourne."

J. H. WARD.—Lowe's work on British ferns gives every species in coloured plates, but it is an expensive work. Dr. M. C. Cooke's little book, "A Fern-book for Everybody," gives illustrations of most of them: published by Warne & Co.

C. DAWSON.—The rubbing from the snout of the saw-fish shows that the species is probably *Pristis antiquorum*. It is a very fine specimen. Probably the fish was ten or twelve feet in length. Saw-fishes are abundant in tropical seas. They are frequently brought home from the Persian Gulf (near Bushire) of a very large size.

A. W. OGILVEY.—From your description, the fallow-deer must have eaten of some unwholesome herb or plant. The leaves of the yew-tree will cause the bodies of horses to be blown up in the way you mention, and death will ensue.

C. S. BOUTELL.—The mites are those frequently found in damp, coarse brown sugar, and are called *Acarus passularum*.

JOSEPH BRETTS (Norwich) and others have kindly sent us notices of the occurrence of white-feathered sparrows. We are much obliged by the numerous and prompt answers, as it shows the mental activity and obligingness of our readers, and we hope the original querist will be satisfied with the evidence produced.

W. W. B.—One of the most complete lists of British birds we have seen is that issued by Mr. H. W. Marsden, of Gloucester. It also contains an appendix for labelling birds' eggs.

E. J. D.—Get Kirby's "Flora of Norfolk." It is one of the best local Floras extant. Thomas Edwards, of Banff, is still living and working, and we hope he will for many years to come. The above address will find him.

EXCHANGES.

A PACKET of twelve unmounted specimens of hairs of various animals sent in exchange for a well-mounted slide or material.—Fairmount, 153 Breakspears Road, Brockley, S.E.

WANTED, to exchange *Umbil. pustulata*, &c., for genuine specimens of *Ram. thrausta*, *R. pollinaria*, *R. polymorpha*, and *R. evernioides*—a few specimens of each.—J. McAndrew, New Galloway, N.B.

WILL exchange Canadian wild flowers, ferns, birds' eggs, Indian curiosities, reptiles, and specimens of geology, for British or foreign (not including Canada or United States) lepidoptera, coleoptera, diptera, or neuroptera.—W. D. Shaw, 34 St. Peter Street, Montreal, Canada.

To naturalists in remote parts of the world: I shall be glad to exchange for collections of coleoptera, lepidoptera, and insects generally.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

WANTED, Cox's "Handbook of Coleoptera." — Edward J. Gibbins, 20 Bootham, York.

WILL send parasite of cod-fish, mounted in balsam without pressure (a splendid object), in exchange for other first-class slides.—Rev. J. Horn, 75 Castle Road, Scarboro'.

I HAVE about 1000 beetles and other fine insects which I desire to exchange in lots of 50 and upwards for good specimens of minerals and fossils; also cocoons of fine American moths for perfect English butterflies and moths.—Fletcher M. Nod, 130 East New York Street, Indianapolis, Ind.

WANTED, specimens of the different species of parasite found on the swallow, also those on bats. Advantageous exchange in microscope slides offered.—W. A. Hyslop, 22 Palmerston Place, Edinburgh.

FIRST three vols. of *Challenger* Report, nearly new and uncut, cost £6 17*s.* 6*d.*; exchange to the value of £2. Wanted, good electrical machine and apparatus.—E. Evans, Brimscombe, Gloucester.

WANTED, a mounted slide, unstained, of *Trichina spiralis* in or out of muscle; also head of tapeworm, mounted, or fluke. Will give in exchange a recipe for writing upon glass or stamping name upon slides.—A. Smith, The Laboratory, Essex Road, London.

FOR foraminiferous sand send stamped directed envelope and some other interesting object.—M., 38 Park Road, Clapham, S.W.

Pileopsis Hungaricus in exchange for other good marine shells not in collection. Send list.—E. Matthews, 20 Lenthall Road, Dalston, London.

HAWKINS's "Comparative View of the Animal and Human Frame" offered in exchange for Bristow's "Manual of Mineralogy" or other works on mineralogy or geology.—J. E. Westby, 83 Barber Road, Sheffield.

EGGS of golden-winged woodpecker and red-winged starling (side blown). Desiderata, other good eggs, or micro slides.—James Ingleby, Eavestone, near Ripon.

LEG of *Lytta vesicatoria* (Blister beetle), &c., in exchange for other well-mounted slides.—John R. Marten, Cottage Hospital, Red Hill.

GREENHOUSE and other plants offered in exchange for anything interesting to an amateur microscopist and naturalist.—J. M. Linden, New Brompton, Kent.

WELL-MOUNTED slides of anchors of *Synapta Galliennia*, selected and arranged in pattern, in exchange for good gathering of *Pleurosigma formosum*.—W. White, 7 Warden Place, Nottingham.

WANTED, Bell's "Stalk-eyed Crustacea," Gosse's "Naturalist's Sojourn in Jamaica," Johnston's "Zoophytes," Ralfs' "Desmidieae," Westwood's "Crustacea," Smith's "Diatomacea Student" (5 vols.), and other works on natural history in exchange for Leighton's "Lichen Flora," Burmeister's "Manual of Entomology," Rymer Jones's "Aquarium Naturalist," &c.—C. A. Grimes, Dover.

COLLECTION of 150 named fossils to exchange for birds' eggs or books, &c. James Ellison, Steeton, Leeds.

MOUNTED slides and micro material, diatoms *in situ*, &c., exchanged by list for micro slides or material illustrative of geology or marine zoology.—W. Gray, Mount Charles, Belfast.

WANTED, British and other recent shells in good condition, correctly named. Have to offer in exchange 420 good dried specimen of ferns, representing as many species, and not less than 38 genera, including *Trichomanes hymenophyllum, Pteris nephrodium, Angiopteris todea*, &c.; also 40 species of eocene shells from the Paris basin, in good condition, named.—S. E. Richie, 2 Longley Road, Tooting, London.

WILL exchange the following living plants, for good correctly-named mollusca:—*Orchis spectabilis, Orchis foliosa, Osmarrhiza nuda, Mimulus ringens, Spiræa palmata, Harpalium rigidum, Anemone Japonica alba, Primula capitata, Senecio pulcher*, and others. List sent.—S. E. Richie, 2 Longley Road, Tooting, London.

BIRDS' eggs (side blown), spotted eagle, asprey, peregrine, merlin, great bustard, phalarope, Iceland gull, avocet, bittern, kite, buzzard, and hawk owl.—John Eggleston, Park Place, Sunderland.

LEPIDOPTERA, duplicates, cratægi, daplidice, napi, sinapis, hyale, sibylla, callum, latharia, iris, atropos, convolvuli, fraxini, hera, &c., exchange for other natural history objects.—John Eggleston, Park Place, Sunderland.

SCIENCE-GOSSIP for 1866, 1867, 1868, bound in one volume, Quekett's "Histology," and other scientific books for offers. Want vol. i. of Cassell's "Magazine of Art."—R. Smith, 55 Great Russell Street, Bedford Square, W.

STARK's "British Mosses," with plates (nearly new), for portable microscopical cabinet with horizontal trays.—S., 63 Leigh Street, Warrington.

I SHALL be glad to exchange specimens of plants and insects peculiar to Manchester and the neighbourhood, for corresponding specimens from other parts of the British Isles, or from foreign places.—J. A. Tooner, Eltham Bank, Levenshulme, Manchester.

WANTED, microscopical pond life, or other good offers for beautiful mounted slides of diatoms, spicules, crystals, pollens, &c.—Edmund A. Rice, 2 Malvern Villa, The Uplands, Stroud, Gloucester.

WANTED, *Splachnum vasculosum, Dicranum virens Mnium undulatum* in fruit, Phascum, *Andræa rupestris*.—Mrs. Bishop, the Platts, Watford.

BIRDS' eggs for others: mottled owl, wheatear, red-winged starling, meadow starling, hooded crow, hairy woodpecker, downy woodpecker, golden-winged woodpecker, yellow-billed cuckoo, black-billed cuckoo, belted kingfisher, capercailzie, Virginian colin, spotted sandpiper, night heron, Canada goose, Egyptian goose, eider-duck, puffin, guillemot, Arctic tern (Shetland), sooty tern, kittiwake, herring gull, lesser and greater black-backed gull, fork-tailed petrel, and sixty other species. Please send list of duplicates to Ralph Turnbull, 8 Cemetery Road, Crewe.

WELL-MOUNTED slides of Eno's Fruit Salt and other crystals for the polariscope, in exchange for other slides or unmounted material.—Hazelnut, 33 Tresco Road, Nunhead, S.E.

NICELY mounted foreign plants and "Midland Naturalist" complete, in exchange for microscopic slides or books.—95 Barbury Street, Birmingham.

WANTED, good entomological, physiological, and other slides, for slides of foraminifera from chalk, and a number of others, all well mounted. Send list first to W. West, 15 Horton Lane, Bradford.

WHAT offers for monocular microscope in good working order, with 1 in. $\frac{1}{4}$ in. and $\frac{1}{8}$? Objectives, by first makers, also condenser on stand. Double mirror, pine cabinet with drawers for objects. Also sixty beautiful mounted slides of diatoms, crystals, pollens, &c., or good offers in live stock. For particulars apply to Edmund Price, 2 Malvern Villa, The Uplands, Stroud, Gloucester.

FOUR volumes of Hardwicke's SCIENCE-GOSSIP not bound, 1878 to 1881, would exchange for side-blown one-hole British bird eggs or lepidoptera.—F. J. Rasell, 30 Argyle Street, St. James' End, Northampton.

UNIVERSAL Fire-clay Furnace (Griffin's), for chemical operations, &c., complete with muffle, retort, and tube-rings, sand-bath, blower, &c. &c. Will exchange for good microscopic cabinet or offers to T. E. Jobling, Coxlodge Colliery, Newcastle-upon-Tyne.

WANTED, in exchange for well-mounted slides of Podura, Diatomaceæ, &c., deposits containing diatomaceæ, polycystina or foraminifera.

WANTED, natterjack, snakes, lizards (foreign or English); also foreign frogs; also live weasel. For hairs unmounted send object of interest (not microscopical) to H. C. Brooke, Sutton Valence Grammar School, Staplehurst, Kent.

BOOKS, ETC., RECEIVED.

"The Geology of the Counties of England and Wales." By W. J. Harrison, F.G.S. London: Kelly & Co.

"Myth and Science." By Tito Vignoli. London: Kegan Paul & Co.

"The Sun." By C. A. Young, Ph.D. London: Kegan Paul & Co.

"Transactions of the Royal Microscopical Society." Feb.

"Annual Report of the Dulwich College Scientific Society."

"Proceedings of the Perthshire Society of Natural Science."

"Land and Water."

"Animal World."

"Journal of Applied Science."

"Natural History Notes."

"Northern Microscopist."

"Midland Naturalist."

"Ben Brierley's Journal."

"American Naturalist."

"Good Health."

"Boston Journal of Chemistry."

"La Science pour Tous."

"Cosmos: les Mondes."

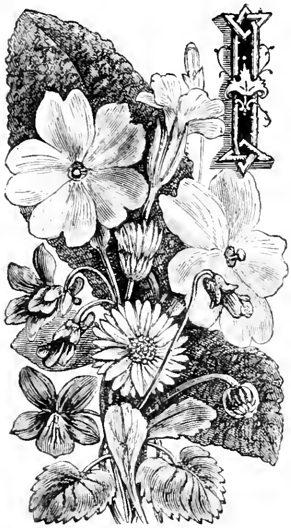
"Feuille des Jeunes Naturalistes."

"Ciel et Terre."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 11TH ULT. FROM:—C. A. G.—E. H.—R. T.—J. S.—J. F.—E. T. D.—R. C.—J. A.—J. B.—J. E. W.—R. S.—J. B.—M. E. P.—W. C. H.—W. W. J. M.—J. R. M.—J. I.—M. N. F.—E. M.—H. L.—G. H.—G. S.—H. M. S.—J. G. S.—H. I. P.—J. B.—J. E.—J. E—J. B.—W. G.—J. W.—N. B.—W. H. W.—M. E. W.—S. E. R.—J. R.—W. J.—E. B.—F. B. J.—J. H. S.—T. B. R.—W. D. S.—F. W.—J. B.—A. W. P.—A. J. N. W.—F.—J. McA—E. L.—T. W.—G. H. P.—C. D. W.—J. H.—E. L. A.—T. D.—DR. K.—W. K. M.—J. B.—A. S.—C. F. W.—G. S.—W. A. P.—E. E. E.—G. H. B.—B. B. B.—W. A. H.—H. M. S.—J. H. W.—E. P.—T. E. J.—J. H.—H. H. C.—T. P. D—H. B.—E. P. D.—F. J. R.—F. H. P.—C. D—J. H. W.—C. G.—M. E.—C. S. B.—W. W.—A. M. P.—G. J. W.—W. W. B.—W. D.—F. C.—R. S.—C. P.—E. P.—A. S.—J. A. T.—&c.

LOCAL NATURALISTS.



IN response to my appeal in SCIENCE-GOSSIP last autumn, the following ladies and gentlemen have kindly sent me their names as being willing to afford local information in the several branches of Natural History which they study to fellow-naturalists visiting their district, or desirous of such information. I trust this list may be the means of bringing together some kindred spirits during the coming season. I had hoped to receive a larger number of replies—many counties being quite unrepresented—but this may possibly form the nucleus of a more extended list next year. I shall be glad to receive any additional names during the next few months. It will be seen one gentleman writes from Sweden: if any of your readers contemplate visiting that interesting country this summer, I have no doubt they would find Mr. Beckman would give them valuable assistance.

A. D. MELVIN.

Madresfield, Malvern, March 1882.

BERKS.

Streetley, near Reading. Emily S. Todd, Hill House. *Botany* (*Phanerogams*).

BUCKS.

Winslow. F. T. Corkett, High Street. *British Birds' eggs and nests, and British Quadrupeds.*

CHESHIRE.

Chester. G. W. Shrubsole, Town Hall Square. *Carboniferous and Silurian Polyzoa.*

DEVON.

Westward Ho! Herbert A. Evans, M.A., on behalf of the U. S. College, Natural History Society, United Services College, Westward Ho. *Botany, Entomology, Ornithology.*

ESSEX.

Dedham. Rudolf Haeusler, F.G.S., &c., Church House. *Geology and Microscopy.*

HANTS.

Newbury, Hants. Marian S. Ridley, Hollington House. *British Ferns and Mosses.*

HERTS.

Hemel Hempstead. Bernard Piffard, Hill House. *Botany, Entomology.*

KENT.

New Brompton. Dr. John H. Morton, The Lindens. *Phanerogamic Botany, Floriculture, Microscopy, and General Natural History.*

Sheerness-on-Sea. W. H. Shrubsole, F.G.S., *Marine Zoology.*

LANCASHIRE.

Ashton-under-Lyne. Ashton-under-Lyne Field Naturalists' Society, per J. J. Newton, Secretary, 55 Hill Street. *Botany* (*General and Medical*), *Entomology, Geology, Taxidermy and General Natural History.*

LINCOLNSHIRE.

Boston. W. H. Wheeler, M.I.C.E. *Meteorology, Geology.*

MIDDLESEX.

London. George Coverdale, 2 Cannon Street. *Entomology* (*Lepidoptera*).

London. A. Loydell, 10 Aulay Street, Ossery Road, S.E. *British Shells.*

Ealing, W. G. D. Brown, Henley Villa. *Botany* (*especially Cryptogams*).

STAFFORDSHIRE.

Stone. W. Wells Bladen. *Oology.*

SUSSEX.

Brighton. Walter G. Woollcombe, B.A., F.L.S., &c. The College. *Botany* (*Phanerogams Ferns and Mosses*), *Land and Freshwater Shells, Entomology* (*Coleoptera and Rhopolacera*), *General Microscopy, Zoology.*

WORCESTERSHIRE.

Evesham. Thomas E. Doeg, 57 Bridge Street. *Botany and Lepidoptera.*

Malvern. Arthur D. Melvin, Madresfield. *Botany* (*Phanerogams*).

Malvern Link. Richard F. Towndrow. *Botany* (*Phanerogams*), *Entomology*.

Worcester. Harold F. Bibbs, 25 Tything. *Botany* (*Phanerogams*).

YORKSHIRE.

Sheffield. James E. Westby, 83 Barber Road. *Geology* (*Local and General*).

York. Robert Dutton, 6 Lowther Street, The Groves. *Entomology*.

York. Arthur Angell, 35 Orchard Street. *Entomology*.

IRELAND.

Lurgan, co. Armagh. Rev. Henry W. Lett, M.A, Ardmore Glebe. *Botany* (*Phanerogams*).

JERSEY.

Bagot. J. Sinel. *Crustacea, Mollusca, also General Natural History*.

SWEDEN.

Askersund. Alfred Beckman. *Botany* (*Phanerogams and Lichens of Sweden*).

ON DRAWING AND PAINTING FROM THE MICROSCOPE.

MR. EDWIN HOLMES in the February number referring to my paper on the above subject, states I omitted to notice that outlines produced by the camera lucida "are reversed, which would introduce a difficulty in filling up from the microscope." This observation is most opportune, as it reveals the possibility that many a young aspirant with a taste for drawing by the aid of a lucida has been in some degree working in the dark, puzzled by his inability to overcome this imperfection of "reversion," and frustrated in continuing his drawing, under direct vision through the microscope.

The remark of Mr. Holmes leads me to infer, that he has worked only with the form of camera lucida, known as the neutral tint reflector—an instrument essentially useful, capable of being handled with dexterity, it does not fatigue the eye, and the field of view is easy to distinguish on the paper; but it has the great disadvantage that everything is reversed, consequently, when removed, any further drawing from the microscope is extremely difficult, not to say, impossible.

This reflector (a square of thin microscopical glass will answer the purpose) is placed in a suitable fitting in front of the eye-piece at an angle of 45°, the microscope being horizontal. Looking through the arrangement, the eye receives the image reflected on the surface of the glass, at the same time seeing the paper and pencil on the table beneath, having only one reflection, necessarily the top of the object is at the bottom of the paper, the bottom at the top, a confusion which impedes, except by an experienced hand, any further progress. The apparatus is therefore only useful for mere outline, rapid sketching, or making memoranda. I am persuaded this neutral glass reflector (as representing a "species" of camera lucida) has often been a snare and delusion to many a young draftsman, and should at once be abandoned by those who are ambitious to do prolonged afterwork.

The best drawing appliance in connection with the microscope is the old Wollaston "lucida" as improved by our present opticians—it is the only tool for the purpose intended—and consists of a prism, in a fitting adapted to the eye-piece. The image of the object is totally reflected upon an oblique surface and carried to a plane at a right angle to its first direction; the eye looking at the edge of this plane discovers the object, and at the same time its phantom on the paper beneath. As everything is twice reflected, it follows that when the microscope is adjusted for direct vision, the drawing and the object are coincident and not reversed. The only difficulty, and I admit it is a difficulty, and a disadvantage as compared with the ease of manipulating a neutral-tint reflector, is the "knack" required to see the image and the tracing-point at the same time, but it is soon mastered, and is after all a mere matter of practice and experience. In using any form of camera lucida, the pencil once placed on the paper should not, if possible, be removed, or lifted, until the work required to fix the positions is finished; the eye (unsteady at the best) and the pencil point should be always in unison; keeping the pencil continually on the paper preserves the "place."

Mr. Holmes's idea of making pictures upon glass for lantern purposes is most excellent and ingenious. I may add that diagrams for lectures may be effectively prepared with an ordinary lantern. Having a fitting carrying objectives of low power, an image may be projected on cartoon paper four feet square. The light is not quite first-rate, but it is sufficient to enable any one to paint in the outlines with Indian ink or sepia.

One word on the Rev. W. Hey's paper on "Pond Collecting in Winter." It may be news to pond explorers, but *now* is the time to inoculate an old, or to start a new tank. The sediment, or mud, from a good undisturbed pond, on a heath or common, at the present season, is crowded with resting spores, statoblasts of polyzoa larvæ, desmids, and a multitude of dormant animal and vegetable life. A suitable receptacle sufficiently large to contain an inch or two of such sediment, and two or three gallons of water from the same pond, will be as clear as crystal in a fortnight, and reveal a world of life, no collector, skimming with a bottle, could ever hope to obtain.

E. T. D.

Crouch End.

NOTES ON THE NATURAL HISTORY OF JERSEY.

By Edward Lovett.

[*Continued from page* 56.]

Fauna. (*Continued.*)

BEFORE continuing our subject, we would like to refer to the figures of flint implements given (see figs. 47, &c.) They are from the same cave as those that were figured in a former paper, and are good type specimens. The knife is a remarkably fine example, and was found by Mr. T. Saunders, of St. Helier's. It is of black flint, beautifully formed, and having the upper curved portion flaked so thin that it is almost transparent; the haft, or lower portion, shows the bulb of percussion well, and the cutting edge is but little injured with the exception of two decided notches which are well shown in the cut. The saw is a fairly good specimen, and illustrates some fine chipping on the cutting edge.

The adze is by no means a common implement; this specimen is composed of a grey opaque kind of flint. The piercer is also a somewhat uncommon form, and is admirably adapted for the purpose for which it was possibly intended, namely, piercing small holes when a "drill" was not necessary.

Referring back to the subject of mammalia, we have been informed that the fox was at a comparatively recent date common in Jersey, though it is now no doubt extinct. Its last stand was made at Surville, Mont l'Abbé and Noirmont, but it is, perhaps, twenty years since it was seen. A rock chasm at L'Etaquerel, in which are the skeletons of numerous animals that have fallen into it, was a favourite home of this animal. It is not probable that the foxes referred to were introduced.

The channel in the neighbourhood of Jersey is particularly favourable to fish on account of its being so easy of access to both warm and cold water species, as well as from the wonderfully diversified nature of the sea bed, where we find rocky caverns, stretches of sandy beds, and enormous growths of Zostera and various algæ in a variety most conducive to the life and development of the numerous species to be met with. Conger eels of enormous size are taken, and with the wrasse, garfish (snipe), bream, sand-eel, and one or two others, are the largest frequenters of the market.

The blue shark is very common, it is often brought in by the boat load and decapitated before leaving the beach; although by no means a despicable article of food, it is generally eaten by the poorer classes. Many rays and skate also are taken, and the oil extracted from the liver of one species is said by the fishermen to be a sovereign remedy for all the ills that flesh is heir to. As regards the bream, it is the black bream that is taken chiefly, the favourite grounds are some eight or ten miles to the south; the bream are fished for with long lines, and a take of eighty or ninety for one boat with two men and a boy in twenty-four hours is about the average, though sometimes a take reaches 100 to 150. The various flat fishes are to be taken in all the sandy bays and salmon is occasionally seen, a fine one of twenty-one pounds weight being taken in February of this year off the pier at St. Helier's. The sun-fish is occasionally seen, and the dorse, or golden cod, has been taken on one or two occasions; one was taken a few weeks since, weighing about 19 lbs. The curious *Cyclopterus lumpus* has been obtained off the coast, and the John Dory is fairly common.

In the low-tide rock-pools near La Rocque may be seen darting hither and thither gobies, blennies and lepidogasters. In May and June the mature ova of the gobies may be seen attached to the rocks, the enclosed embryo being clearly visible through the transparent egg envelope. The ova, too, of the blenny may be found in sheltered niches packed with loose algæ, thus forming a nest; in the autumn the rock-pools are alive with miniature shoals of these species, the fry being at that time from half an inch to three-quarters of an inch in length.

Of the lepidogasters, two species are fairly common and another is, we believe, about to be described as new to our waters.

The sand-eel, genus Ammodytes, is a most interesting fish; two species, *A. tobianus* and *A. lancea*, occur, and it would appear as if there was a third species, but of this possible addition to the British fauna we hope to be able to give further particulars later on. "Sand-eeling" is a favourite nocturnal sport in Jersey. On favourable nights, at the proper season, the "sand-eelers" leave the shore in boats at half low tide and proceed towards some well-known bank which they reach at low tide. Upon raking the surface of these sand-banks with a suitable implement, the concealed fish leap out and are transferred to the basket, although it requires an experienced hand to accomplish this somewhat slippery feat. In the months of September and October the sand-eel may be taken in this manner in the daytime. It is locally known as the "Lançon."

As regards fresh-water fishes, carp and tench occur in the few ponds, but have possibly been introduced; the eel and stickleback are, however, common in the little streamlets, and the miller's thumb is to be found in a brook in the Vallée des Vaux.

Of the Marine mollusca a large and interesting number of species are to be met with on the shores of Jersey, and many exceedingly rare and southern forms occur here in comparative plenty. The "Ormer," *Haliotis tuberculata*, is an example of this: it grows to a fine size and is obtained in large numbers for food, principally from the reefs round the island, of which the Minquiers are the chief.

A remarkably rare shell, *Mactra glauca*, has also been taken here; this species is the largest of the Mactras and certainly the most beautiful, its glossy epidermis giving it a very handsome appearance.

The genus Trochus is well represented and includes *T. magus*, *T. lineatus*, *T. striatus* and *T. umbilicatus*. *Lutraria elliptica* and *L. oblonga* occur at La Rocque and St. Aubin's Bay.

The Nassas are common, and in May their curious ova on the Zostera in the low-tide pools may be commonly met with. A number of species of the genera Rissoa, Littorina, Odostomia, Cardium and many others are well represented. *Donax politus* and *D. anatinus* are fairly common and *Pectunculus glycimeris* come up in numbers, in the dredge from St. Aubin's Bay. *Emarginula reticulata* occurs in deep water in St. Clement's Bay, and *Murex erinaceus* and *M. corallinus* are common in most of the bays.

Of the Cephalopods, *Octopus vulgaris* is often common, and many have been taken in Jersey roads of great size. Some have measured as much as seven feet in expanse of stretch, so that the Devil fish which figures so prominently in "The Toilers of the Sea," where the locality is an adjacent one, is a by no means exaggerated animal. It is generally used for bait, but is sometimes eaten after being sundried. The writer can give an opinion as to this mollusc as an article of food, though not of a satisfactory nature; the flesh is tough and of an indiarubber consistency, and the flavour is by no means delicate—it may, in fact, be considered a failure in this respect.

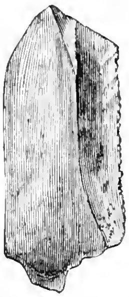


Fig. 47.—Small worked flint with finely serrated edge, probably used as a saw (N.S.).

Fig. 48.—Piercer (N.S.).

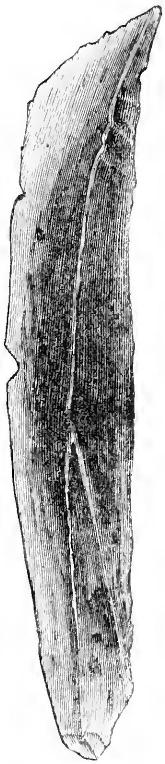


Fig. 49.—Curved flint knife (N.S.).

Fig. 50.—Adze (N.S.).

Of the land Mollusca there are a fair number, and even a few fresh-water ones, although so little exists in the shape of brooks, ponds, &c., for the development of the latter. The genus Helix is well represented, and includes *H. pisana* and *H. pulchella*. *Bulimus acutus* is very common, and presents a great variety in its markings. *Achatina acicula* is also said to occur. The island generally is very favourable to those species that are adapted to a warm and damp condition of things.

With regard to the Nudibranchiata, many species are common, *Aplysia hybrida* comes up with nearly every haul of the dredge, and various species of Eolis and Doris are scarcely less known.

The curious gelatinous-looking masses of ova of the latter genera may be seen attached to the rocks, exposed at low tide, during the early summer months. They are very remarkable and, when viewed under the microscope, are seen to consist of minute spherules evenly distributed through a jelly-like matrix.

As regards the Polyzoa, a large variety may be noticed, embracing a number of genera; but, as they present nothing of special interest with reference to Jersey in particular, it may be sufficient to say that, owing to the favourable locality in which they occur, they are not only very plentiful, but also in considerable variety.

The insects of Jersey are not considered by Entomologists to be British, and no doubt that strictly speaking, this rule ought to extend to other sections; for, geographically, the Channel Islands are decidedly continental; that is, they have formed a part of the Continent since the severance of the British Isles from the Continent.

That the Channel Islands are politically British does not alter the fact that their natural history, although very similar to that of the southern parts of England, is nevertheless closely allied to that of the Continent; and insects, reptiles, mollusca and plants all help to prove this.

Of lepidopterous insects, the butterflies are not numerous, and are, moreover, somewhat small. One of the most interesting species is *Thecla rubi*, which occurs in considerable numbers round the bramble thickets on the rough coast near Bouley Bay as well as in other localities. The moths are better represented, and embrace a number of genera. *Acherontia atropos* is much more common than in England, owing no doubt to the prevalence of its food plant and the favourable conditions under which it exists. *Sphinx convolvuli* is also common, as many as four or five specimens having been taken in one evening, usually, as is often the case elsewhere, on damp fabrics.

The Jersey tiger-moth, *Calimorpha hera*, is a well-known common Jersey species; *C. jacobæa* is extremely so, its slow sluggish flight and marked colour making it quite an object of attraction along the roads near the town during the time it is "out." Many of the Microlepidoptera are very different from the English types, and, if thoroughly worked out, would no doubt show that, on the whole, the lepidoptera of Jersey are essentially continental.

As the Crustacea are of special interest, we propose devoting a paper to their consideration and will conclude this with a few notes on the Annelids and Echinoderms. These do not present any features of unusual interest, except that, like other inhabitants of these shores, they exist in considerable numbers and enjoy the advantages of very favourable conditions of existence. Some of the families of the Annelids are largely used for bait, and are known as "Rock worms;" the beautiful Aphroditas attain to a fine size, and the *Sabellæ*, *Serpulæ* and *Terebellæ* may be seen to great advantage in pools, in the hollows of caverns and rocky fissures.

Of the Echinodermata, *Amphidotus cordatus* and *Spatangus purpureus* are to be met with, as well as *Echinocyamus pusillus* and the more common *Echinus sphæra* and *E. miliaris*.

The star-fishes are represented by *Uraster violacea* and *U. gracilis*; *Ophiocoma neglecta* and *O. rosula* and *Solaster papposa*, as well as others, *Asteria gibbosa* being remarkably abundant on the shelving stretch of rocks of Clement's Bay and La Rocque.

(*To be continued.*)

Late appearance of a Swallow.—On November 6th 1881, a swallow was seen at Arboe Rectory, county Tyrone, by the Rev. C. L. Garnett.—*S. A. Brenan.*

THE DONKEY.

(A VIGNETTE FROM NATURE, DRAWN WITH THE THUMB.)

"Don[illegible] the final flowers of long ages of native evolution, the natural head and crown of one great line of mammalian development. To doubt their intelligence is to impugn the whole conduct of nature . . . Donkeys cannot help being clever . . . They do not represent mere stranded and struggling relics of older types, like the very silly Kangaroos and Ant-eaters and Hedgehogs . . . I feel a genuine respect for every donkey I meet, when I remember that it was the mere accidental possession of an opposable thumb that gave my ancestors a start over his in the race for the inheritance of the earth towards the very close of the tertiary period."—*Vignettes from Nature.* By Grant Allen.

How, flower of nature, could it come to pass
That we should say "as stupid as an ass"?
Why thus the donkey intellect describe,
Or so asperse thy great mammalian tribe?
Injustice such as this to the long-eared
Must wait not, but be instantly repaired!
To doubt thy cleverness were to impugn
An all-wise Providence—to judge too soon!
No struggling relic of an older type,
Why should you feel the stick's unfeeling swipe,
Or the coarse costermonger's coarser call,
When we must own thee as the crown of all?
No more the butt of wit's sarcastic gibe
Himself, as stupid, must the wit describe!
What clever thoughts go coursing through thy pate,
My dearest donkey, mine own ungulate!
Artemus Ward may well be left to bless
And revel in his kangaroo's own "cussedness,"
The silly kangaroo that, from his birth,
Seeks but the holes and corners of the earth
To drag a losing life behind the times,
And die a certain death in distant climes.
I for thy tribe a greater rev'rence feel,
As o'er my senses thy vast merits steal;
For, had I not possessed this back-bent thumb,
You would have spoken words and I been dumb
Yours it would have been on earth to pray,
While my vocation would have been to bray.
This accident alone gave me the start
By which I ride, while you do draw the cart.
I own thy kinship with a brother's pride.
Came not my "firmness" on the donkey side?
What wisdom, Dogberry, could thy wit surpass,
When thou didst claim to "write me down an ass"?

A. Conifer.

Beech-trees and Storms.—I find in the *Guardian* of November 9th an extract from the "Tour of Forestry," which states that from statistics obtained "Beech-trees weathered the great gale of last month better than other trees." In this district I can testify that the beech-trees were the sufferers, and that some of the finest specimens were laid prostrate. Fir-trees suffered little. It would be interesting to ascertain what other observers say on the matter.

A BOTANICAL RAMBLE AROUND WEYMOUTH.

WEYMOUTH does not seem to have attracted much attention as a hunting ground for botanists, although easy of access from London, and well known as a seaside resort. Yet a few days spent in its immediate neighbourhood would well reward even a cursory exploration. Within a drive of eight or ten miles, at the pretty little village of Abbotsbury, there is a small garden belonging to Lord Ilchester, so rich in botanical curiosities that it may well vie in interest with the botanical gardens of many of our large provincial towns. Here may be seen two or three species of *Eucalyptus*, one of them apparently *E. coccifera*, having greyish-green rounded leaves; the Assam tea plant looking healthy and vigorous; Camellias, forming handsome bushes, and numerous medicinal and economic plants brought by a former Lord Ilchester from abroad. All these flourish luxuriantly without any protection, in the open air, and give a semi-tropical aspect to the garden, which is still further enhanced by the fan-like leaves of the pretty little palm *Chamærops humilis*, and tufts of Fortune's bamboo scattered here and there, and exotic ferns climbing up the boles of the trees or peeping out from among the ivy leaves on the old walls. In a sheltered corner the Maidenhair fern may be observed growing side by side with different species of Osmunda and other rare ferns, which all seem equally at home. A fine tree of the Cork oak with well-developed bark, showing the formation of cork, may also be observed.

Within about a mile of these gardens a picturesque ruin of a church crowns the summit of a hill overlooking the ruins of the old Abbey from which the village derives its name. These remains, which are partly utilised by a neighbouring farmer, were explained to us by the Rev. G. H. Penny in a manner that would have delighted the heart of an antiquary; but, being on botany intent, the discovery of the rare lichen *Lecanora candelaria* in some abundance on an apple-tree among the ruins, and of a colony of *Festuca sciuroides* on the churchyard wall, made a stronger impression on the mind than even the great extent of the ruined brewery, which in its palmy days must have afforded delightful employment to the monks of the olden times. Probably they paid also some attention to medicine and cultivated a garden of herbs, judging from the abundance of Borage in the lanes near by, and from the occurrence of the *Saponaria officinalis* in a neighbouring hedge. Not far off, near the end of the long narrow strip of water that runs behind Chesil beach, as the grand pebble ridge is called, *Althæa officinalis* grows in abundance among the reed beds; the marshy ground, at the time of our visit, was also gay with the lilac flowers of the wild Michaelmas daisy, *Aster Tripolium*. Here, too, may be seen, under the auspices of the keepers, one of the largest swanneries in the world, numbering over two thousand birds. They are fed occasionally with maize, but their proper food, or "swan's meat," as pointed out to us by the keeper, is *Zannichellia pedicellata*. Owing to a quantity of the plant being torn up during the past stormy winter, many of the swans were starved. Mr. T. B. Groves, however, informs me that they also feed on the *Zostera marina* var. *angustifolia*, which is abundant around Weymouth; and although the keeper denied this, I myself saw them feeding on a Zostera bed below Sandsfoot Castle, near Smallmouth, where the Zannichellia does not grow. Close by the Swannery may be seen some decoys for wild ducks, reminding one of the Norfolk broads or Lincolnshire fens on a small scale. Here the bald-headed coots and the half-wild decoy ducks were the solitary occupants at this time of year, except two swans, which we were informed by the keeper reserve this piece of water as a nursery in which to teach the cygnets to fly, and into which these two swans never permit the others to enter or to interfere with their peculiar privilege.

On the neighbouring old elm-trees, the rare moss *Leptodon Smithii* occurs in considerable abundance, and in the marsh ditches *Monostroma bullosum*, with its dark green blistered fronds, forms a striking, though ugly, feature. On the pebble ridge opposite could be seen at a distance extensive green patches, which Mr. Barrett, a Weymouth botanist, informs me consist entirely of the sea pea, *Lathyrus maritimus*. The yellow seaside vetch, *Vicia lutea*, also grows there in abundance, although *Vicia lævigata* seems extinct; indeed, many other rarities, which would well repay the long and tiring walk along the ridge, are said to grow on the pebbles. By the roadside between Weymouth and Abbotsbury, the bullace (*Prunus insititia*) was observed in fruit, while the graceful plumes of *Calamagrostis Epigejos* ornamented the damp hedgebanks in several places, and the elegant drooping spikes of *Carex pendula* attracted attention in a ditch, near the corner of a shady copse. *Silaus pratensis*, with its glossy green leaves, and pale yellow umbels, to which it probably owes its name of sulphurwort, was a conspicuous weed by the roadside, contrasting prettily with the delicate sprays of *Sison amomum*, which here seems also to be an abundant species.

A visit to Portland Island proved that this little strip of land would also well repay a careful search. The first object to attract attention was the pheasant's eye (*Adonis autumnalis*), its lovely crimson flowers being scattered abundantly over a cornfield at the top of the cliff; here too *Valerianella eriocarpa* occurs. Lower down, below Pennsylvania Castle, the pale green foliage of the wormwood, and the bright blue flowers of the borage caught the eye even at a distance; and close by, the plant supposed to be *Statice Dodartii* was shown me by Mr. W. C. P. Medleycott. This, however, proved to be not that species, but

S. occidentalis. The character of the majority of the plants on the under cliff presented the usual features of a limestone flora, like that of Plymouth and Torquay; *Picris hieracioides*, *Hypericum montanum*, *Scabiosa Columbaria*, *Salvia Verbenaca*, *Asperula cynanchica* and *Origanum vulgare* being characteristic species. The conspicuous fruit-spike of the bee orchis was also noticed on dry grassy spots. Two plants that I had never observed on limestone in Devon, were here sparingly present; viz., *Lactuca muralis* and a fine specimen of *L. virosa*. But the cryptogams afforded by far the largest number of novelties. *Roccella phycopsis* was evidently the species which has hitherto been described as *R. tinctoria*, the latter being a Mediterranean species which ought to be expunged from the British Flora. On the beetling cliffs a few specimens of this lichen were found in fruit, together with an abundance of *Opegrapha grumulosa* and *Chiodecton Sarniense* in crumbling masses, two lichens of which the former only has, I believe, been found elsewhere in Britain, near the valley of rocks at Lynton, and the latter at the same place, and near Penmon, in Anglesea. On the boulders nearer the sea *Dirina repanda*, a lichen only reported in England from Lynton and Great Orme's Head, occurs in considerable abundance on the shady under surface of the large blocks of limestone, and is of so brittle a character that the blow of the hammer not unfrequently detaches it in fragments. Wherever bruised, this plant, as well as *Chiodecton*, shows the curious yellow tint distinctive of the *chrysogonidia*, by which these lichens are easily distinguished from their allies. Another very rare lichen, found also at St. Vincent's Rocks, near Bristol and at Torquay, occurred in some abundance on the shady side of a ravine among the rocks. Only those who have met with a rare plant in a locality in which it has only once or twice been found before, and who never expect to find it elsewhere, can understand the pleasure that such a "find" in an unhoped-for locality gives rise to. The species here spoken of is one of the gelatinous lichens, *Synalissa symphorea*. Near by, in the damp hollows of the limestone, a few specimens of the characteristic limestone moss *Weissia verticillata*, were found in fruit. Other rare lichens met with were *Placodium candicans*, *Collema chalazanum* and *C. plicatile*, *Lecidea canescens* in fructification, and *Verrucaria incavata*, a curious little plant, looking like pins' heads immersed in the rock; *Ramalina evernioides*, a species usually found on palings or trees, but here growing on the rock: here and there too, the pale yellowish crusts of *Lecanora sulphurea*, and the thallus of *L. ochracea* looking like orange-yellow stains on the rock, stood prominently out from the neutral tint of the stone.

The conchologist, too, might probably find some rarities here. The pretty shells of *Cyclostoma elegans* with and without opercula, neat specimens of *Helix lapicida*, and the tiny ones of *Helix rupestris*, as well as abundance of *Bulimus acutus* and other uncommon shells, were frequently met with.

Many a rare moss, new to the district, also gladdened our eyes. The pretty little *Hypnum circinatum*, a plant which grows abundantly in the Coliseum at Rome, is a common species at Portland, but was nowhere seen in fruit. Indeed, although occurring abundantly in a few southern localities, it has only been found once in that state in England, near Padstow. Its near ally, *H. striatulum*, also shy in fruiting, occurred here and there in patches closely adherent to shady rocks, and in one spot the subalpine *Pterigonium gracile* spread its glossy, curled branches. *Neckera crispa*, an elegant species, whose shining undulated leaves at once attract attention, *Tortula tortuosa*, *Trichostomum crispulum*, easily distinguished by the tips of the leaves being incurved like the bow of a boat, and *Phascum crispum* (its tiny capsules nestling among the leaves, alone distinguishing it at night from *Weissia controversa*)—all characteristic limestone species—were consecutively met with; while of "new" mosses, *Trichostomum littorale* ornamented the turf near the sea with broad yellowish patches; *Trichostomum flavo-virens* occurred sparingly in crevices wetted by the spray; *Tortula nitida*, in compact tufts, was abundant on the dry limestone blocks, and easily recognised by the midrib of the leaves shining like a piece of brass wire, the leaves when wetted being found to be almost all broken at the tips; and *Tortula sinuosa* in loose brownish patches, every stem distinct and leaves imperfect at the tips, occurred here and there. All these, observed in the course of a morning's ramble, showed that much yet remains to be done before the botany of Portland Island is thoroughly known.

Leaving the island and crossing the sands near the railway towards Weymouth, many rare plants may be collected; among others *Suæda fruticosa*, forming dark green patches, occurs in some abundance. Here and there *Chenopodium murale* crops up, and under the walls the stinking orache, *Chenopodium olidum*, may be recognised by its "ancient and fish-like" odour (due to trinethylamine) as the foot treads upon it. *Salicornia fruticosa* and *Polycarpon tetraphyllum*, the latter well deserving its name of All seed, for little else but the fruit can be seen in small plants, may be found by those who know where to look for them. *Poa compressa*, *Triticum acutum*, *Festuca uniglumis*, and other rare grasses, at this time of year (August) almost unrecognisable, are not unfrequent on the sandy banks, as well as the singular *Lepturus incurvatus*, which, but for the yellow anthers hanging on the sides of the stem-like inflorescence, would be easily overlooked. Crossing the Bridge, *Thesium linophyllum* and *Juncus maritimus* occur abundantly on the damp meadow on the right, and *Lathyrus aphaca* and *Vicia Bithynica* grow freely on the cliffs on the left.

Keeping to the right and visiting the seaside near

Sandsfoot Castle, the algologist, if he be fortunate enough to be there at a low springtide, will find the Zostera beds uncovered, and among them may gather the "mermaid's hair"—*Lyngbya majuscula*—forming blackish patches on the sandy mud, and *Polysiphonia subulifera*, a very rare species, of a reddish colour when fresh, but black when dry, growing entangled among the roots of the Zostera. Fringing the sides of the pools he will find *Laurencia tenuissima*, of a pale yellowish colour in the water, but purplish when dry, and *Mesogloia Zosteræ* in abundance, while in deeper water and attached to Rytiphlœa, the singular sausage-like fronds of *Asperococcus Turneri* at once attract attention. In the shallower pools the pretty *Padina pavonia* occurs in some abundance, while *Stilophora rhizodes*, and a narrow form of *Cutleria multifida*, only distinguishable from the last by its flat fronds, are cast up from deeper water.

E. M. Holmes.

WATER SNAILS; A STUDY IN POND LIFE.

By the Author of "Plant Life."

And so you think we have entirely explored the whole of this quiet Surrey village and its beautiful surroundings of hills and valleys, woods and shady lanes? You are mistaken, my friend. There is sufficient ground unbroken to afford us yet a score of rambles ere we return to town. This afternoon I want to take you for a stroll along a lovely lane, where we can walk in the grateful shade of smooth-stemmed giant beeches. Anon, the path lies over the slope of a hill, between banks of sandstone, where we may gather ferns galore, and harebells in profusion. Again it dips, and we pass through a copse. Further, a bit of boggy ground attracts our attention to swarms of the round-leaved sundew, whose dainty crimson rosette-like leaves show brightly amidst the tufts of fresh green sphagnum. On again, and soon we have to push our way through bracken more than six feet high, coming out upon a bit of heathy ground with a farmhouse to the right. Just past the farmhouse is another lane with male ferns thickly clustered in the hedgebanks. To the left there is a gap in the bank, and we pass through into a wilderness of gorse and bramble. Near us is a large pool, sheltered by a tree or two, about whose far-reaching roots scores of the stiff pale fronds of the prickly-toothed shield-fern rise up. Let us throw ourselves beneath this tree and see what there is to be seen. There is excitement caused by our approach. Splash! splash! whirr! caused respectively by a big frog, a vole, and a moorhen; the two former taking shelter in the pond, the latter fluttering through the bushes away from it. All now is quiet—still as death, and not a ripple on the surface of the tarn. Over the water flit many dragon-flies in search of insects smaller than themselves. There are three well-defined varieties we can distinguish on the wing. One, a tiny, fragile bright blue insect whose rapid, but apparently motionless flight, is attained by the ceaseless flutter of its delicate wings. Then a larger, robust-looking species, with long, broad wings, and a short, broad, and depressed body, coloured grey-blue, and lacking the fine polish of the third species, which is the dragon-fly, *par excellence*. This third kind, which may represent several species, has grand netted wings which measure four inches from tip to tip. Its body is round, and richly marked with stripes and bands of yellow, blue, and green. Its beautiful luminous eyes are very large, and occupy a considerable portion of the head and face. All the species

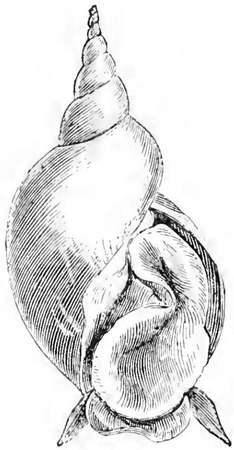


Fig. 51.—Pond Snail (*Lymnea stagnalis*).

Fig. 52.—*Lymnea pereger*.

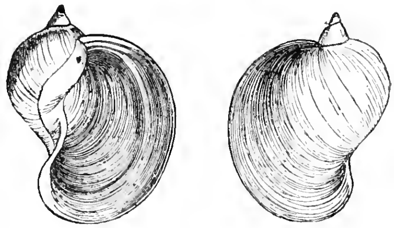


Fig. 53.—Shell of *Lymnea auricularia*.

love to linger near the pools, where their early lives were passed, darting over the water in pursuit of more defenceless creatures.

The water's surface is partly covered by the tripartite leaves and the beautiful woolly-throated, softly-tinted flowers of the bog buckbean, whilst below there is an aquatic jungle of pond-weed, through which great shoals of the three-spined stickleback come into the clearer water, returning rapidly on the slightest suspicion of danger. Let us take our net and draw it rapidly through that miniature forest. The mimic trees bend to the slight force exerted, and much of their animal life is dislodged. We bring the net (constructed of stout holland with a piece of strong lace let into the bottom) to shore and examine our haul. Seven sticklebacks, one newt, numerous specimens representing three species of the water-bugs, as many water-beetles, and two pond-snails. We separate them, and place them in different pickle-bottles, classifying them according to their pacific or bellicose dispositions, for the pond is a microcosm in which species prey and are preyed upon, and the struggle for existence goes on as keenly there as in the larger world it mimics. We take another dip in another part of the pond, and this time besides fish, beetles, and bugs, we get more snails, some fresh-water shrimps and a leech. So we go on dipping and hauling until our bottles are filled, when we retrace our steps along the beautiful lanes to our village resting-place.

And now let us overhaul the contents of that tin canister containing the snails, leaving the beetles, newts, &c., to be considered to-morrow. See what a variety there is even among these pond-snails. At a rough glance we can detect at least seven species. You ask what interest attaches to such creatures? There is a good deal in their life-history that is interesting, if we will only study it.

If we take one of these snails from the water, the animal immediately withdraws itself completely into the shell, exposing only a small portion of its surface. Put it into the water again, and a great portion of its body will be again protruded. Watch its movements. The flat portion of the animal is pressed against the glass and adheres tightly. That flattened body is called the "foot;" but you must always remember that it has not the slightest analogy to the foot of any animal, and the term is therefore a misleading one. The term has been in use so long that it would be difficult now to change it, especially as the scientific names of several of the classes are founded on it. If we watch the motion of the foot as it is pressed against the glass we shall notice that this movement is effected by alternate contraction and dilatation of its surface, the result being a series of ripples, commencing from the animal's muzzle and terminating at its further extremity. The head is furnished with a pair of "tentacles," which being very sensitive, act as feelers. At the base of the tentacles are the eyes, and between them, on the under surface, is the mouth. Look at the glass again, and you will see that the mouth is continually opening and closing with a regular motion. Its upper margin is armed with a horny mandible and within there is a peculiar light-brown band, which seems to scrape the surface of the glass. This is known as the lingual ribbon or "tongue." It is a most remarkable organ consisting of a very long narrow ribbon, thickly studded with very minute flint hooks which are arranged in a definite order, differing in each genus. By the continual movement of this ribbon the animal scrapes off its food, whether animal or vegetable in nature.

(*To be continued.*)

THE DIASTOPORIDÆ: OR THE NATURAL HISTORY OF A FAMILY TYPE.

By George Robert Vine.

Careful observers, whenever they have visited the seaside, either for study or for pleasure, cannot have failed to notice, some at least, of the many calcareous incrustations very common on weeds, stones, and dead and broken shells. They may also

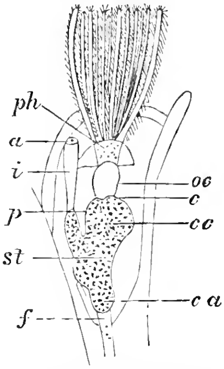


Fig. 54.—Zoœcia Polypide of *Bugula plumosa*. *ph*, Pharynx; *oe*, Œsophagus; *c*, Cardia; *c c*, Cardiac cavity; *st*, Stomach; *ca*, Cœcal appendage; *i*, Intestine; *p*, Pylorus; *a*, Anus; *f*, Funiculus. (After Hincks.)

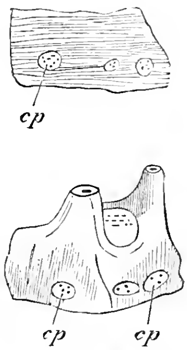


Fig. 55.—*Membranipora membranacea*. Wall of zoœcium. *c p*, Communication plates.

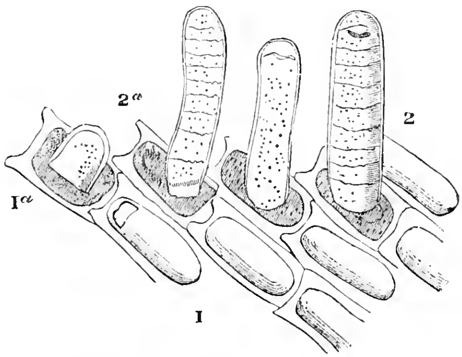


Fig. 56.—*Membranipora membranacea*. 1, Cells covered by membrane, showing "area-orifice," or mouth; I*a*, Projecting spines: 2, Showing abnormal cells, or what Nitsche called "Tower-zoœcia"; 2*a*, Smaller, or less-developed abnormal cell. These peculiar cells are distributed very irregularly over the zoarium. They were first noticed by Ellis. (After Hincks.)

have toyed with a few of the feather-like plumes which are sometimes, during severe storms, torn from the deep and cast up with hundreds of other waifs and strays, to rot or bleach upon the shore. Or they may have passed some few hours with the dredging fishermen, and as haul after haul was lifted into the boat, and the contents of the dredge emptied on the deck, they might have picked out some more dazzling plumes that seemed to charm a passing fancy, or appropriated some shell that was more beautifully covered with calcareous coatings than others, either for the purposes of study, or to charm other eyes with its delicate beauty, as curious as their own.

If there be any desire on the part of the reader to learn the history, or to unravel the characters of the two common seaside objects, he will be amply recompensed if he takes up any book describing the Polyzoa or the Hydrozoa, to be found even on our own British coast. The incrustations common on shells, stones, and weeds, on every shore, belong to what we prefer to call Polyzoa;* the "sea mats" are included with these, and the waving plumes, Sertularia and Plumularia, belong to the Hydrozoa. In this series of articles, I shall direct the attention of the reader to the Polyzoa, the first of these two groups.

All the marine Polyzoa belong to three very important suborders; and one other group, frequently found in rivers and pools, belongs to what are called the freshwater Polyzoa, so admirably worked out and classified by Professor Allman. Only two out of the four groups are found as fossils; one group, in some one or other of these forms, ranges in time from the lowest Silurian beds to the present seas; the other having genera, or species, dating back to the Cretaceous era, and some of these not earlier than Eocene times. It will serve our purpose, if we take two types from the remaining suborders, and allow these to be the representatives of each, one of which is called the Cheilostomata, and the other the Cyclostomata.

In the pools left by the receding tide, and sometimes cast upon the shore, we often meet with large fronds of *Laminaria digitata*, literally covered with the beautiful Polyzoa *Membranipora membranacea*. There is scarcely any limit to the rapid development of this species, and Dr. Landsborough mentions a specimen on Laminaria, five feet in length by eight inches in breadth. This is large, but it is a common thing to obtain specimens two feet long by two or three inches in breadth. A common hand-glass, magnifying from five to fifteen diameters, will show the structure very well; but it requires a magnification of from 50 to 200 diameters, to reveal much of the hidden beauty, and a much higher power before we can say we know the special details to which we wish to direct the attention of the reader. By applying the hand-glass to specimens it will be seen that the fronds of Laminaria are covered with silvery cells, of an oblong character, disposed in lines. The cells are alternate, and at each angle there is a stout hollow spine. The whole of the front of the cell between the boundary walls is called the area, and this is covered with a delicate membrane, except at the uppermost part, where there is a semicircular or crescentic opening. This is the orifice or mouth.

* They are called Bryozoa by our continental friends.

Under this membranous covering, the polypide, an animal with about twenty very long tentacles, may be found in a living state in some of the cells, if the Laminaria and the Polyzoa are taken and preserved under favourable conditions. We must not suppose that the animal lived in the whole of the space below this membranous covering. The common morphology of a species of Polyzoa, and *Membranipora membranacea* is no exception to the rule, may be seen in reference to fig. 55. Here we find that a common cell, either membranous or calcareous, has two distinct parts, an outer cell (the home of the polypide) and the polypide. The polypide is a kind of tube, sometimes called an alimentary zooid, bent upon itself, having two orifices—the mouth and the anal. This tube completely closes up the cell during life, and the vacant spaces which the tube does not occupy are filled with fluid. The cell is independent of the animal, but it would not be exact science to say the polypide is independent of the cell, though in one sense such is the fact.

Supposing then that the reader desires to know something of the Polyzoa generally, we will take portions of *Membranipora membranacea* and subject them to an analysis. When the Laminaria and Polyzoa are washed in fresh water, to get rid of the excess of salt, it is ready for operating upon. The best way is to mount or examine several large fragments, so as to get a general knowledge of its structure. There are an immense number of cells closely packed together—every one apparently separated one from the other—yet every one is connected. All the closely packed cells would be called the polypidom or polypary by Johnson and others; it is now known by the term *cœnecium*, or in other words the common dermal or skin system of a colony. If we take a portion of the colony and scrape it on to a glass, add a little turpentine or benzole and then mount in Canada balsam, we shall have transparent sections of several cells in all manner of positions; or we can make sections of the Laminaria and Membranipora, and prepare and mount these so as to show a side view of both. Using tolerably high powers ranging from $\frac{1}{2}$ to $\frac{1}{6}$ inch objectives, we shall be able to detect perforations in the side and end walls of the cells, composed of much thinner material than the ordinary substance of the cell walls. There are several of these in the species under description. These are "Rossetten Platten" (fig. 55). of Reichert, or "communication pores" of Smitt and Hincks. In all the Cheilostomata these plates are present, and in another suborder, the Ctenostomata, they are also present, but generally at the base of the cell. In the living Polyzoa these communication-pores are essential so as to allow the passage from cell to cell of very fine cords, which Joliot provisionally terms endosarc, the special function of which is supposed to be of a generative character. Fritz Müller was the first physiological writer who attempted an "interpretation of this element structure." He regards the funicular system as a true nervous structure, but one which is related to the life of the colony rather than to the individual zooids composing it. To him it is a common or colonial nervous system, which has to do with "the associated movements" of the Polyzoa, or such as do not seem "to depend upon the will of the individuals, but to be carried out by them in obedience, as it were, to a command from a higher quarter." *

The cell itself has two coatings, an outer and an inner one. The outer coating is the ectocyst, a simple structureless membrane, which to a large extent is strengthened or made solid by a deposition of calcareous particles. The inner layer is the endocyst, and the specific function of this cyst is that it gives "origin to all buds formed within the cœnecium, and to the generative products of both kinds." Joliot, the French biologist, refuses to accept this view, for "he regards the endocyst as specially charged with the enlargement of the colony, and also as giving origin to a distinct tissue, which he names the *endosarc*, to which are really assignable the functions hitherto credited to the endocyst, and others as well." †

Besides these internal structures, there are several external ones belonging to the cheilostomatous Polyzoa. These are the appendicular organs, and they consist of the Avicularian or bird's-head processes, and the Vibricula or hair-like processes. They have also opercular coverings over the mouths of the cell. True cheilostomatous Polyzoa may be summed up then, whether in a living or a fossil state, as possessing some one or other of the following distinctive characters. A mouth below the terminal part of the cell (subterminal) having opercular coverings; communication pores in some part of the cells, ova cells, and remains of either Vibricula or Avicularia.

The other type, the Cyclostomata, have in nearly all cases tubular or subtubular cells, the mouths of which are terminal, and there are no communication pores or appendicular organs; and it is to this sub-order that the Diastoporidæ belong.

In treating of our subject from a natural history standpoint, it will be more convenient to trace our family type backward in time. If we were dealing only with a palæontological question, we should reverse the order and begin with the lower rocks, and trace the developmental processes upwards. To the general reader the former will be the most intelligible, and I feel convinced that it will not be less so to the purely scientific student.

It would have been impossible for me at one time to have written this paper, and the sketch or original draft of it has lain by me for years, waiting the results of inquiries into the history of true Diastopora only just recently completed. Forms very diverse in character have been classified and catalogued under the name of a single genus, when they properly belonged to three, or at the least two genera. In tracing our history backward, I shall confine myself to a single type; and wherever it is possible or practicable I shall give a running list of the associated Brachiopoda found in the same horizon.

In Mr. Busk's "Museum Catalogue" * of the Polyzoa, part iii., the Diastoporidæ is the fourth family, and two genera only are included in it; these are Diastopora and Mesenteripora; the first, a crustaceous, the other a foliaceous form. In the Rev. Thomas Hincks's recently published "History of British Polyzoa,"† there is no family group of this name; the Diastopora are included in the family group Tubuliporidæ, and the foliaceous forms are also included in the genus Diastopora.

For the purpose of this inquiry, I shall use Mr. Busk's family arrangement instead of that formulated by Mr. Hincks, for reasons that will be apparent before the conclusion of these papers; at the same time, I am bound to admit that the latter is by far the more natural classification.

(*To be continued.*)

A RAMBLE ON THE FELLS IN SEARCH OF EGGS.

SOON after sunrise, on a lovely May morning, I sallied forth from the old-fashioned farmhouse of Woolfenhall, which lies secluded in a hollow at the foot of Parlic Pike, fully equipped for a nest hunting expedition on the fells dividing Lancashire and Yorkshire. At this hospitable abode I had arrived the night before, filled with pleasing anticipations of a ramble with one of the shepherds, an intelligent young fellow, who had promised to lead me to the haunts of some of the feathered tribe, who particularly delight in choosing these wild and sequestered regions for the purpose of nidification.

Leaving the house by a zigzag road, used for the purpose of bringing down, in sleds, the peat cut and dried during summer on the top of Fairsnape Fell, for winter fuel, and crossing a spur of Parlic, we ascended Fairsnape. From this hill a splendid panorama of the country may be viewed. On the stone walls, and heaps of stones, were to be seen many wheatears (*S. œnanthe*) flicking up their tails, and uttering their cheery "chack, chack," as they flew from stone to stone in front of us. The nest is usually so far down amongst the heaps of stones, that it is hard to get at; and I only managed to root out one example of this bird's rather slovenly-built nest,

* For a full discussion of the question, see Rev. Thomas Hincks's "British Polyzoa."
† Hincks's "Introduction to British Marine Polyzoa."

* Catalogue of the Cyclostomatous Polyzoa. Brit. Mus. 1875.
† Van Voorst, 1880.

containing five pale-blue eggs. As we were watching some of the birds, a merlin (*F. æsalon*) suddenly swooped down and snatched one away in its talons. Breeding occasionally on these fells, this handsome and smallest of our falcons is fully as bold and courageous as any of its congeners, and I have seen it attack both partridge and ring-ousel with success. It has never yet been my good fortune to procure any local specimens of the merlin's egg, nor of the hen harrier's (*C. cyanus*), which also sometimes breeds here, and a pair of which we saw during the day, hunting over the sides of Langdon Fell.

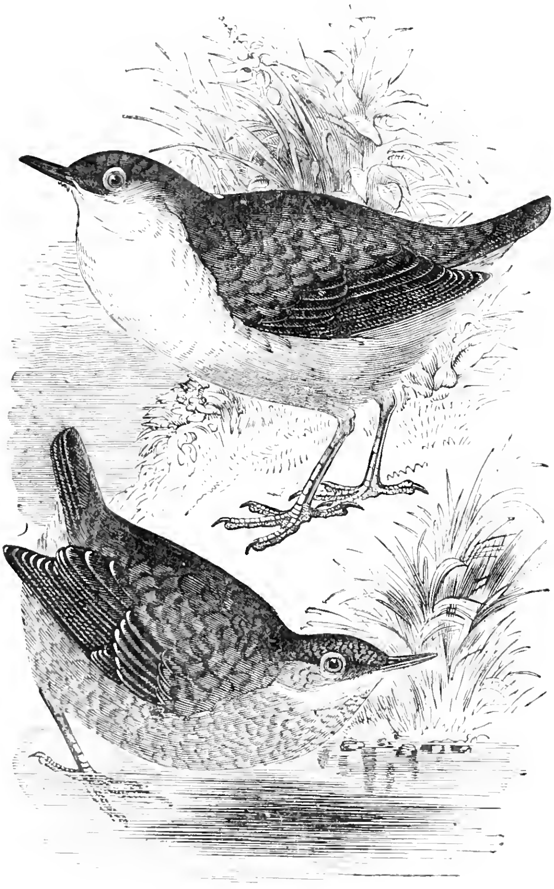


Fig. 57.—Water Ousels *(Cinclus aquaticus)*.

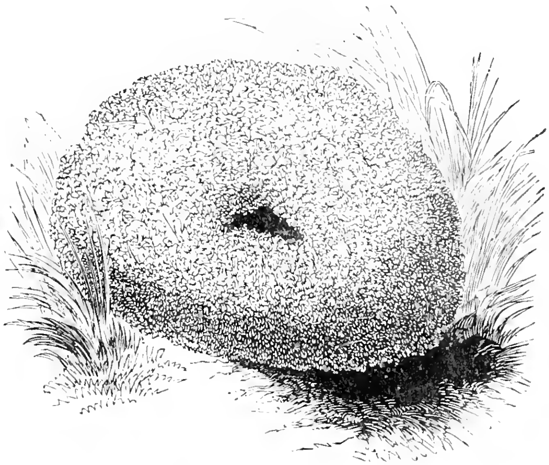


Fig. 58.—Nest of Water Ousel.

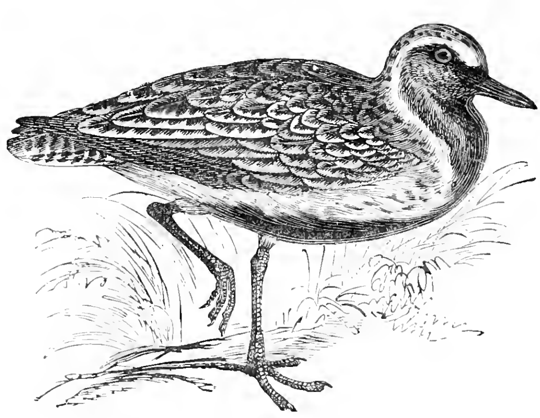


Fig. 59.—Golden Plover *(Charadrias pluvialis)*.

When fairly amongst the heath we soon heard the loud laugh-like cry of the red grouse (*L. Scoticus*), as one after another rose close to our feet, and whirred on rapid wing down the mountain-side. Many nests of this beautiful bird did we stumble upon during the day; a great proportion of the eggs being "hardsat," and bereft of much of their natural beauty by being soiled. The eggs are very beautiful, and variable in colour and markings, and I have noticed that many are much scratched and smeared, as if the colouring matter were very soft, when laid and had been rubbed off in extrusion. We found scores of grouse eggs sucked by the carrion crow (*C. corone*), and scattered here and there. The crow is a great destroyer of other birds' eggs as well. It breeds not uncommonly on these hills, usually in some secluded clough, where the fork of a fir or mountain ash affords a resting-place for the large nest of sticks and twigs, snugly cushioned with wool, in which are laid the four or five greenish eggs, mottled with greenish ash and light brown. It is always called "raven" by the shepherds, and they look upon this fierce and cunning bird as a great pest, for not unfrequently it pecks out the eyes of sickly sheep and weakly lambs. Years ago, when it was an object with me to add eggs of both raven and crow to my collection, I was induced by the news of a "raven's" nest being found in a distant part of the hills to make a special journey thereto, but I had my trouble for nought, beyond satisfying myself that the "raven's" nest was but that of a crow, for it was empty. The raven (*C. corax*) is never seen in this part of the country. I found a crow's nest on a tree overhanging a deep ravine, and on scrambling along

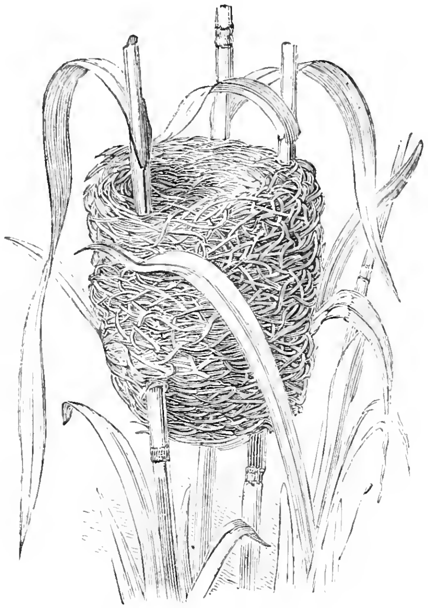


Fig. 60.—Nest of Reed-Bunting.

Fig. 61.—Nest of Sedge-Warbler.

the trunk, was pleased to find four eggs. Of four other nests found during the day, two were tenantless and two contained young ones.

The top of Fairsnape being mostly peaty, with numerous hillocks covered with ling, and here and there portions covered with stones, growing amongst which is a short benty grass, affords excellent cover for the nest of the golden plover (*C. pluvialis*). The plain-

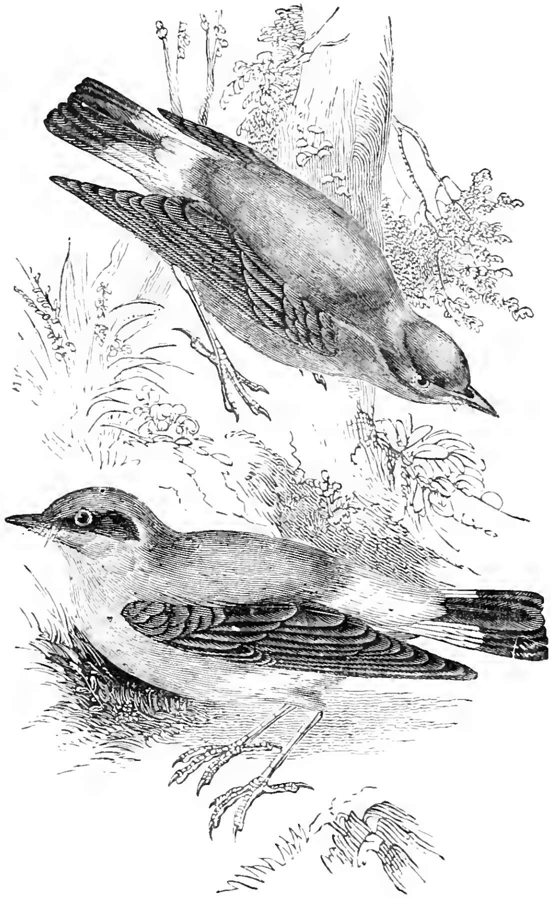


Fig. 62.—Wheatears (*Saxicola œnanthe*).

tive alarm whistle of this pretty bird saluted our ears as soon as we showed ourselves, but our search for its nest was not successful in this spot. Later on in the day, I procured eggs from two nests on Langdon Fell. The nest is an especially difficult one to find, being very slightly built, usually close to a stone or tuft of grass; and the four eggs—which are enormous ones for the size of the bird—and of a stone colour, thickly blotched with dark or blackish brown, closely resemble the surroundings. During the first few days of incubation, the old bird runs silently and stealthily, to a considerable distance from the nest before rising, when warned by the voice of her mate that danger is approaching, but after sitting ten days or so, she becomes very unwilling to move, and will almost suffer herself to be trodden upon before she will stir. Owing to the wide expanse of rough ground to be traversed, it is almost impossible to systematically search for the nest of the golden plover, or curlew (*N. arquata*), for both these birds are but sparsely distributed over these hills. We generally had a pair or two of curlews flying after and around us; their incessant cries plainly expressing resentment at our intrusion, and distrust of our intentions. I took three eggs from a nest built on a level spot on the hillside, close to a small pool of water. They are very large, pear-shaped, and of a greenish hue, blotched with shades of darker green and dark brown. I also procured eggs from two other nests, of which the shepherds had indicated to us the whereabouts.

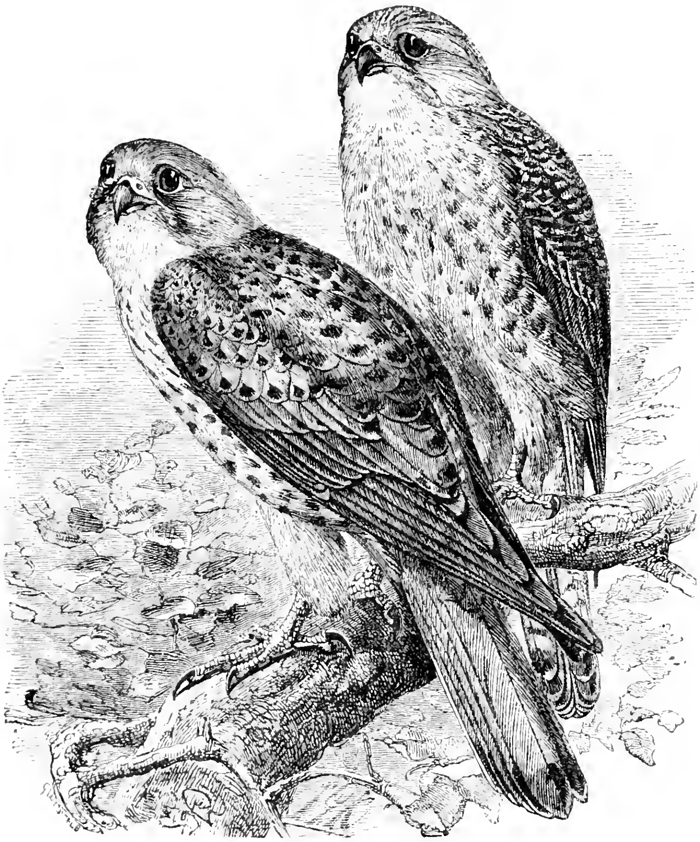


Fig. 63.—Kestrels (*Falco tinnunculus*).

Nearly all the time we were on Fairsnape we were accompanied by twelve or fourteen swifts (*C. apus*), which the shepherds call "longwings" and "devil-skirlers." They kept whirling round and round us, dashing down and snapping up the numerous insects disturbed by our passage through the heather. Several times they came so close as almost to brush our hats with their long wings, and kept uttering their wild and peculiar squealing notes. I was pleased to have such a good opportunity of observing and admiring their wonderful powers of wing as they gamboled around us. The following day, I procured some of their elongated white eggs from an old out-barn, where some six or eight pairs had nested for years. They were very difficult to get at, and only by wrenching out a large stone with a crowbar, was I enabled to fish out two eggs, with the aid of a teaspoon tied to a stick. I have noticed many swifts breeding in clefts in the rocks, in the quarries on Longridge Fell.

We now made the best of our way across fells covered with ling, and whin, and bracken fern, and heaps of stones, amongst which the bilberry grew plentifully, towards a clough leading into the Langdon valley, which my companion said "swarmed with birds of all sorts." On our way we saw two pairs of twites (*L. montium*), but, although we searched long and carefully, we did not find a nest. Amongst the furze we found several nests of linnet (*L. cannabina*) and here and there came across several pairs of stonechats (*S. rubicola*) and whin-chats (*S. rubetra*). The stonechat is not very common here, and I have had a difficulty in procuring local specimens of its eggs; but the whinchat may be called common, and we found three nests, each containing six bluish-green eggs, slightly specked with dull red, chiefly at the larger end. The nest is not easy to find, unless you first startle the bird off it, and is usually placed upon the ground, at the foot of a low bush, or in a tuft of dead fern or long grass. Many patches of swampy ground were crossed, in which that curious little midge-trap, the round-leaved sundew, grows abundantly. These swampy spots are frequented by many snipes (*S. gallinago*), several nests of which we came across, built in rushy tufts. My companion was very expert in finding them, and also those of the lapwing (*V. cristatus*), which swarm on the grassy slopes of the fells. We could easily, if we cared, have filled all our boxes, &c., with lapwings' eggs. We were always accompanied by a noisy crowd of them, when we came too near their nesting grounds. On these slopes were numerous pipits (*A. pratensis*). We found several nests, in one of which was a young cuckoo (*C. canorus*). I was much amused to watch its spiteful efforts to peck the end of my stick. Its foster-parents meanwhile fluttered around in a tremor of apprehension lest I should harm the impish-looking creature, but they had no cause to fear that I should rob them of their uncanny nursling. We at length reached our destination—the clough—which we began to descend, occasionally throwing stones into the whin bushes, and clapping our hands, to startle the birds from their nests. This clough swarmed with ring-ousels (*T. torquatus*), and we found many nests, some containing young, and others, eggs in various stages of incubation. On approaching several nests of young ones, I was struck by the peculiar notes uttered by the parent birds, which now seemed close at hand, and again afar off. After careful observation, I satisfied myself that the sounds were ventriloquial, and their object, to lure us away from the nest. When uttering these notes the birds were never very far from me, and I was surprised at the manner in which my ears were deceived. We found in this clough three nests of kestrel (*T. tinnunculus*), all containing eggs, and built, one on a jutting rock, and the others on the ground, amongst the ling. Several of these birds were in sight most of the time we were on the hills. The wild and lonely cloughs afford this harmless, but persecuted bird, a tolerably secure refuge from its worst enemy—the gamekeeper—who relentlessly hunts it to death with as untiring energy as he does the more destructive kind of hawks. After searching the clough, and when we had entered the lovely valley of Langdon, we rested awhile, and then devoted several hours to searching the neighbouring fells, and not without success. Nesting in holes in the rocky sides of Langdon Fell, were several pairs of rock-doves (*C. livia*), and I got a pair of eggs from a cleft in a steep scarp. I also found several pairs of starlings (*S. vulgaris*), nesting among these rocks, although they are miles away from any human habitation, and a most unlikely place for this bird to breed in.

We now began to turn our faces homewards, and after some rough walking over ground from which the ling had been burnt the previous autumn, we crossed and descended Saddle Fell, into a valley, into and through which ran several small streams On the rushy banks of these we found nests of reed-bunting (*E. schœniclus*), and sedge warbler (*S. phragmites*); and as we got lower down, we disturbed two stately herons ("long-necks," the shepherds call them), which come up here to feed upon the numerous small trout, to be met with in every tiny rill hereabouts. A shepherd, whom we met just as one rose, told us a tale of heronry most unique and extraordinary, but for the truth of which he vouched. He had been, he said, to the neighbouring village of Chipping, to get

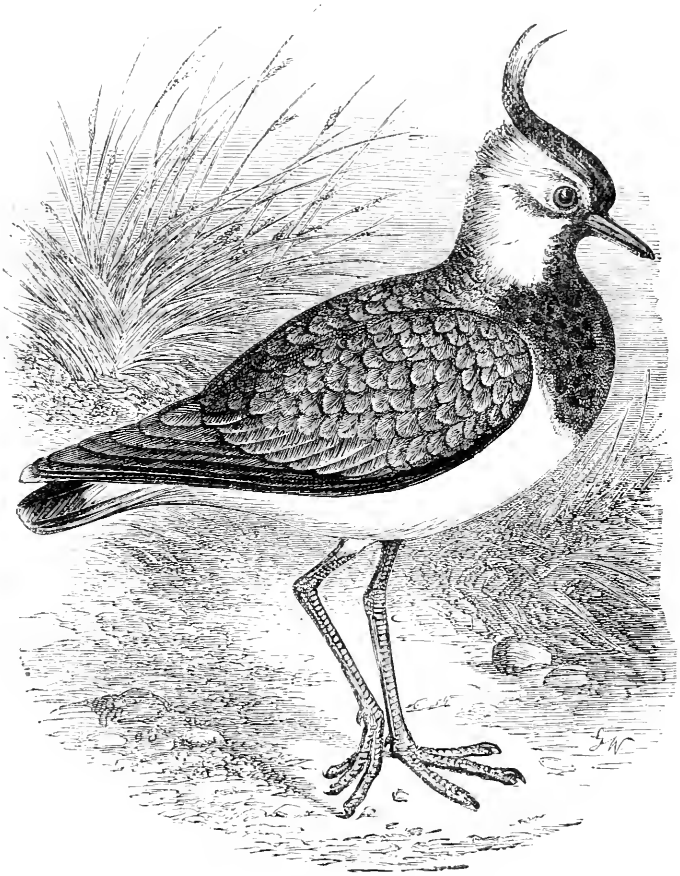


Fig. 64.—The Lapwing (*Vanellus cristatus*).

his clogs (wooden-soled shoes) repaired, and was returning home in the dusk of evening, carrying in his hand his clogs, tied together by their thongs. Just as he sharply turned a corner of the brook he was walking beside, he came upon a "long-neck" in the act of bolting a water rat. The bird gave a hop, and spread its wings to fly, but before it could rise from the ground, the man hurled his clogs at it, and the thongs entwining its neck, the unfortunate bird became a captive. He took it home, but it refused all food, so he sold it for a shilling to a stranger who chanced to call. Numerous sand-pipers

(*T. hypoleuca*) frequented the sides of the streams, and we found no fewer than eleven nests containing eggs. Several grey wagtails (*M. boarula*) were running briskly over the stones in the brooks; and lower down, the pied wagtail (*M. alba*) was very common.

The shades of evening beginning to deepen, we gave up nest-hunting, and made the best of our way back to Woolfenhall. It was with pleasurable feelings of satisfaction, mingled with a shadow of regret, that my delightful ramble had almost come to an end, that I trudged along over peaty moss, and rushy swamp, through ling, and whin, and beds of graceful bracken fern; my ears keenly alive to the many wild, but harmonious sounds that stirred the peaceful scene and sent a thrill of pleasure through me. Faintly, from the hills, came, at intervals, the mournful wail of the golden plover; the ringing "Poo-e-lee, poo-e-lee," of the curlew, and the laughing cackle of the grouse. From the brooks rose the incessant plaintive piping notes of the sandpiper, whilst high overhead "drummed" many a snipe. These sounds were at times almost drowned by the clamour of our escort of lapwings. As we passed through a coppice near the house, I heard more than once the loud "churring" note of the nightjar (*C. Europæus*)—a bird not uncommon on these hills; but whose pair of beautifully marbled eggs it has not yet been my good luck to take.

It was quite bed-time when we got to the house, tired and hungry enough, for the liberal supply of provisions we took with us had long ago been exhausted. There is nothing like a ramble on the hills for sharpening one's appetite. Thus came to a close a day fraught with pleasant recollections to me, and I heartily wish many a brother naturalist, who is obliged by circumstances to be pent up in the busy town, but whose heart yearns after the calm delights of the country, could inhale the pure ozone, and enjoy the countless beauties of nature to be met with during a day's "Ramble on the Fells."

R. STANDEN.

Goosnargh, Preston, Lancashire.

ON THE ORIGIN OF HAIR-BELL, FOXGLOVE, &c.

THE question as to the correct spelling of the vulgar name of *Campanula rotundifolia* has been well ventilated in SCIENCE-GOSSIP, but does not appear much nearer solution than when first begun, indeed, it seems hopeless to expect it; authors, botanists, and others, do not appear to know to which plant the name properly belongs, *e.g.*,* in Bentham's "Handbook of the British Flora," "Hairbell, see Harebell" occurs; on reference to the latter, we find *C. rotundifolia* is intended.

In Babington's "Manual of British Botany," hairbell is given in the body of the work, and in the index of popular names, harebell (*C. rotundifolia*). In his "Flora of Cambridge" that plant is called harebell.

R. Buxton's "Botanical Guide," "*C. rotundifolia*, round leaved bell-flower or hairbell."

> E'en the slight Harebell raised its head
> Elastic from her airy tread.
> Hooker, *Brit. Flor.*

> The laughing, the nodding, the dancing Harebell.
> *Romance of Nature.*

"Hare's Bells" occurs in Ainsworth's Dictionary, but having reference only to "*Hyacinthus Anglicus.*" "Harebell, squill, or wild hyacinth," Smith, "Flora Brit." "English hyacinth or harebell," Lightfoot, "Flora Scot." "Harebell or wild Hyacinth," "Eng. Bot." "Wild Hyacinth or Harebell," Hooker, "Brit. Flora." "The azured Harebell," Shakespeare's *Cymbeline.*

> The Harebelle for her stainless azure hue
> Claims to be worn of none but those are true.
> Browne's *Britannia's Pastorals.*

"Hairbell, the name of a flower; the hyacinth," Johnson, Dict. 5 ed. fol. 1784. "Harebells, *Hyacinthus non-scriptus*," "Calendar of Flora," Bishop Stillingfleet.**

Withering, "Arrangement of British Plants," 7 ed. 1830, has the following passage: "*Hyacinthus non-scriptus* is the genuine British harebell, whilst the little campanula, and which we call heath bell, is the harebell of Scotland, while the harebell of England is the Scottish blue bell, intimately associated with one of our most popular modern airs."

In this mass of confusion it seems utterly impossible to arrive at any satisfactory decision. It appears to me, from the very obvious resemblance the flower bears to a bell attached to a hair, that hair bell would be the popular name, rather than hare bell, the only reason assigned for the latter being that the plant lived on heaths, and hares also.

The popular name of Digitalis is almost as obscure as hairbell. It is asserted, and with considerable show of probability, that foxglove should be foxes' glew, or gliew—being Anglo-Saxon for music, or a ring of small bells attached to an arch, and which seems to have been a favourite instrument with our Saxon progenitors; and as the arrangement of the flowers bore a resemblance to that of the bells, they gave the plant the name of foxes' bells. In support of this we have the Norse names, rev bielde, fox bells; and reveleika, fox music. In support of foxglove, or rather of the affix glove, we have in English fairy gloves. Old German fingerhuit=fingerhat, from whence is derived the local word hutkin (the finger of a glove being frequently used to protect a cut or sore finger) and fingerkraut=finger plant. The Flemish, vinger-

* For the references from * to ** I am indebted to the Rev. Kirby Trimmer, of Norwich.

cruidt, has the same meaning. Old French, gent' de nostre Dame (gloyes of our Lady); and doigtier (fingerstall).

The old Italian name was Aralda; the plant appears to have been much esteemed for its medical virtues, hence the proverb, Aralda piagha salda (Aralda salveth all sores).

The origin of the popular names of plants must for ever remain more or less doubtful; many of them are mispronunciations of the Greek or Latin names, or they have been misunderstood; as for example, lukos wolf (instead of leukos white), or bufonio, instead of bubonio, see "Ortus Sanitatis," ch. 431. The word Hebenon was discussed some years since in SCIENCE-GOSSIP (Hamlet calls it the "cursed" not "deadly" hebenon), and I believe it was generally supposed to mean henbane. "Love in idleness," or rather "love in idle," *i.e.* in vain, from the A.-S. ydel, is the *Viola tricolor*. Shakespeare's allusion to the "Faire vestal throned by the west," in connection with "Love in idle," leaves little doubt as to the flower intended.

Haemony is probably the same as Emony, a popular corruption of Anemone. I have often heard Anemones called Nemonies, and a single flower a nemony. "The insane root that takes the reason prisoner," is no doubt *Atropa Mandragora*, with which Circe bewitched the comrades of Ulysses.

Standergrass: this name seems to have been applied to various species of Orchis. Old Lobel says, "Dese naevolghende soerten van Standelcruyden ziin in Greecks geheeten Cynosorchides, in nederduytsch Hundtscullekens." Boldberries query, in allusion to the two pseudo-tubers.

Asparagus is the pure Greek name, and is not a corruption of speargrass as Talbot * supposes. Clove carnation, so called on account of its clove-like perfume. Houseleek means house plant; leek = A.-S. leac, a plant, not the leek (*Allium porrum*).

Gooseberry is not derived from Johannis Beeren,† but from the Flemish, Kroes-besie; in Old German Kreuzbeer Crossberry, so called on account of the triple spines which often have a cruciform arrangement. Rue, apparently a corruption of the Latin name of Ruta. Herb o' grace, a play upon the word rue, repentance. "There's rue for you and some for me, we may call it Herb of grace a Sundays." (*Hamlet*).

Southernwood is called in the Leechdom sutherne-wude, an abbreviation of sutherne-wermod, southern wormwood. Wermod (A.-S.) means a plant to keep away worms or maggots. Lady's traces (*Neottia spiralis*) should be tresses, the flower spikes resembling braided hair.

F. KITTON.

* "English Etymologies," by H. F. Talbot, 1847. I have somewhere seen it stated that Sparrergrass was a corruption of Speargrass. His etymologies are mostly incorrect.

† Johannisbeeren are currants, Johannisbeerstrauch currant-bush, &c.

MICROSCOPY.

CUTTING SECTIONS OF COAL.—It has been stated in various treatises on the preparation of microscope objects (dating from 1856 to 1881) that thin sections of coal may be cut with a razor, if the specimen has been previously macerated for about a week in carbonate of potash. This direction has been copied sometimes with, and sometimes without acknowledgment, from the "Micrographic Dictionary," in which the author of the paragraph on "Coal" gives the above quoted formula as "the method that has been attended with most success in our hands." In my hands it has been attended with complete failure. I soaked some pieces of coal about a cubic quarter-inch in size for a week, in a strong solution of carbonate of potash, but found them as hard as they were previous to the maceration. I replaced the fragments and again tried them at the expiration of a month, with the same result. I again replaced them and did not try them until something like twelve months had passed away (having in fact forgotten them)—result as before. I now as a *dernier ressort* added more carbonate, and starved them for about twelve hours—result the same as before. Will any of the readers of SCIENCE-GOSSIP who have tried the above process, kindly state their success or non-success with it? If their trial of the "method" has been like mine, a failure, it is a very pregnant instance of the vitality of error, and also that the authors, or rather compilers, of the numerous treatises on the microscope have never tried the processes they recommend. The following very simple plan would, I think, very effectually prevent useless, and perhaps harmful formulæ attaining the respectable age of a quarter of a century, viz., that those who have tried any new process should state in a few words the result in the pages of this or any similar publication.—*F. Kitton.*

WHAT IS THE MEANING OF THE SIGN × ?—I am led to trouble you with a few lines respecting the use of the above sign, from having occasionally noticed a statement something of this kind. "This diagram is taken from an object seen under an inch objective, say × 50, but it has been enlarged ten times and therefore represents the object × 500." Here evidently is a misconception of the sign ×. This surely denotes something more than amplification. It includes a definite amount of detail, *e.g.*, an object seen under an eighth objective may correctly represent × 500. Let this image be compared with that of the same objective under an inch power of, say 50 diam. enlarged ten times, the difference will be most marked. Take another example. An object drawn by means of a camera or tinted reflector at ten inches from the eye-piece, would be twice as large as if drawn at five inches, but both pictures would represent the same magnifying power. Unless, therefore, there be detail corresponding with the amplitude, the object is not × so many diameters.—*T. R. J.*

Pond Life.—Mr. E. W. Wilton, of Northfield Villas, Leeds, has appointed a large number of professional collectors in various parts of Great Britain and other countries, so as to supply students with living objects. This will be a great boon to the increasing number of microscopists who find little time or opportunity to collect for themselves.

Microscopical Drawings.—I have read with much interest, the notes on drawing from micro. in your columns. Most people imagine that such drawings can only be made with the aid of an expensive camera lucida, and little dream that one of the thin glass covers of which they have such numbers, will, when properly adjusted to the eye-piece, produce an exact image of any transparent object placed on the stage. All that is needed is a small thin piece of brass or tin to hold it and clip the eye-piece, so that the bottom of the cover corresponds with the bottom of the lens. The light will require some adjusting, and if there is failure, it is due to the light not being properly adjusted. I find that the light should be some distance from the table, at right angles to the microscope, so as to throw the same amount on the drawing as on the mirror. For those who do not care for the trouble of making such an elaborate apparatus, Mr. Bolton, of Birmingham, supplies them post-free for eightpence! if applied for by the name of "Finest reflectors."—*John Alexander Ollard.*

Mr. Thomas Bolton's "Portfolio."—No 7 of this periodical issue of drawings and descriptions of living organisms (animal and vegetable) illustrative of fresh-water and marine life, is to hand. It includes illustrative descriptions of Bacteria, *Asterionella formosa*, *Surirella bifrons*, and various species of Gyrosigna, as well as *Spirulina Jenneri*, among the vegetable kingdom; and *Trachelomonas bulla*, *Telotrochidium crateriforme*, *Amœbæ*, *Acineta grandis*, *Sertularia pumila*, *Aglaophenia pluma*, *Ophiocoma neglecta*, *Tubifex rivulorum*, *Floscularia cornuta*, *Polyphemus pediculus*, *Canthocamptus minutus*, *Doris tuberculatus*, *Eolis Landsburgii*, &c., among the animal kingdom. This part is fully up to the high character which its predecessors have obtained, and Mr. Bolton evidently spares no pains to please and instruct his clients.

Poison Glands in Frogs.—I do not believe that any frogs, French or English, has a poison gland, or possesses the power, like a toad, of giving out a poisonous exudation from its skin, and I advise H. R. T. to read "British Reptiles," by Dr. M. C. Cooke, where he will find much that is interesting about both Batrachians. Does your correspondent mean by "French Frog," the edible frog *Rana esculenta*?—*Helen E. Watney.*

ZOOLOGY.

Parasites on Dyticus marginalis.—The parasites mentioned by your correspondent Abbot G. Laker, in the February number of Science-Gossip, as found by him on the *Dyticus marginalis* are most likely one of the immature stages of a species of watermite, probably that of *Hydrochoreutes globulus* of the family Hydrachnidæ. It is parasitic only in the intermediate stages of its life, being a free swimming animal in its perfect state. Mr. Andrew Murray in his work entitled "Economic Entomology," states that the eggs are deposited in the stems of various water plants, producing when hatched a little six-legged animal with a large heart-shaped sucker in front, which might easily be mistaken for the head, but for the eyes being placed on the interior margin of the back. It is in this stage that they attach themselves to the various aquatic insects on which they are found, doubtless to feed and undergo their final changes. The mounted specimens that I have were all taken from a Dyticus, and are slightly different in one or two respects to those described by Mr. Laker; the difference, no doubt, arising from the fact that his specimens were more fully developed and about to change into the nymph or third stage. There is a striking difference in the respective sizes of Mr. Laker's and my own specimens. The average length of mine was about $\frac{1}{25}$ inch, while those of Mr. Laker were giants in comparison. His are probably full-grown. There is one important feature connected with the heart-shaped sucker in front of the head, which I should like to note, that appears to have been overlooked by Mr. A. Murray. He does not mention in any way the two mandible-like organs, situated one on each side of the sucker, close to its junction with the rest of the body. So far as I am able to make out, they consist of an organ composed of three joints, terminating in a most terrible-looking claw, with four hooks of different lengths, two of them much longer, sharper and rather more curved than the remaining two, which are however much wider at the base. The claws are turned inwards towards the centre of the sucker, somewhat after the manner of a spider's fangs, and also appear to have a slight downward action. The object of these organs at the side of the sucker is, without doubt, to assist the animal to retain its hold upon the unhappy insect it may happen to select as its host, as in one of my specimens a portion of the skin of the beetle was torn away in removing the parasite, and which I found impossible to free from the sucker without injury; so it was mounted just as it was, and one of the claws can be seen apparently buried in the skin, where it is sufficiently transparent to allow the light to pass through. My own humble opinion is, that these mandibles are used for the purpose of attaching itself to the beetle it infests, and the sucker used to extract its juices. Perhaps some other readers of Science-

GOSSIP may be able to give us a little more information on the subject, and tell us which is the head proper in these curious larvæ. Also what is the economy of those circular-shaped dots placed on each side, and also on the hinder margin of what I term the cuirass? Are they spiracles? Will Mr. Laker kindly state if he noticed the mandibles attached to the sucker, and also if the legs were still present, as in the nymph stage they are absent? I might mention that I have only found them on two occasions, each time on the male Dyticus.—*Henry Blake.*

ACHATINA ACICULA.—I have lately found in a railway cutting at Ealing specimens of the burrowing mollusc (*Achatina acicula*). They occurred at a depth of about ten inches below the surface. All were dead and empty, except that one contained an egg which, as is usual with Achatina, was of large size in comparison to the shell and nearly filled its outer turn. Turton says they are common in Yorkshire, and I am told they have lately been found in Essex.—*Geo. D. Brown.*

CAMBRIDGE ENTOMOLOGICAL SOCIETY.—The 30th anniversary meeting of the Society was held on February 9th in the Secretary's rooms. Mr. Brown was re-elected president, Mr. W. G. Lax of Trinity secretary, Messrs. Hunter, Burgan, and Raynor, vice presidents; Mr. Warring, librarian. The programme for the year was then made out, and includes excursions to Brandon, Monk's Wood, and other places of entomological interest. Mr. Brown hopes to read a paper on the Pterophoridæ at the next meeting.

"THE BUTTERFLIES OF EUROPE."—Part III., of this work is to hand, by D. H. C. Long, F.L.S. It is in every respect equal in artistic merit to the preceding parts.

SIR WYVILLE THOMSON, F.R.S.—It is with much regret we have to announce the death of this distinguished naturalist, who, as our readers are aware, was chief of the scientific staff during the *Challenger* expedition. Sir Wyville Thomson has died of paralysis at the early age of fifty-one.

MOUNTING SHELLS.—In the March number of SCIENCE-GOSSIP, W. C. Hey gave some good hints for mounting shells. In place of wood tablets, I find glass covered with paper to have the following advantages: (1) It does not warp. (2) Both shells and paper can be removed, if required, from the tablet, simply by placing them in water for a few minutes, when the shells come off safely and the tablets receive no damage from the water, and are ready for repapering. (3) Glass tablets are cheaper than tablets of wood. The average price of sizes from one inch by 3 in., up to 4 in. by 3 in. made from the glazier's scrap glass selected about the same thickness, may be had for 1*s.* 6*d.*, per gross. Tablets in a cabinet look all the better when full, and one, or two, or more rows of shells may be put on with advantage where they are to spare. Thin glue for applying the paper to the glass has this advantage over paste: it goes on smoother, and adheres firmly at once, requiring no pressure in drying.—*David Robertson, Glasgow.*

BOTANY.

THE BRITISH MOSS-FLORA.—By Dr. Braithwaite, F.L.S. Part v. of this excellent and beautifully illustrated work has just been issued, dealing with the families *Leucobryaceæ* and *Dicranaceæ.* The parts, 3*s.* 6*d.* can be had of the Author, 303 Clapham Road.

NOTES ON THE ARBUTUS.—With reference to Mr. Rason's queries, I beg to say that I am aware that the genus Arctostaphylos belongs to the Arbutus tribe, and though I have no recollection of having seen an example, I suppose that neither *A. uva-ursi*, nor *A. alpina* could be very well mistaken for the tree-like *Arbutus unedo*, for Babington's Manual describes both as procumbent in habit with long trailing woody stems. From my own observation *Arbutus unedo* flourishes as luxuriantly here as at Killarney, many of the trees being from twenty to thirty feet in height, and I am informed that there are scores of places in England where it flourishes, flowers, and fruits equally well as at Blaise Castle. It occurs here principally on either side of Kingswestow Hill, and a pathway through the wood on the southern side is locally known as the Arbutus Walk. How and when it got there is more than I have been able to ascertain, but in all probability it was imported many years ago. I am informed by a competent authority, who has been acquainted with the trees for forty years, that some of them are over a hundred years old. So far as I can learn, neither species of Arctostaphylos has been observed in this neighbourhood.—*J. W. Cundall, Bristol.*

LARCH-TREES IN SWITZERLAND.—Dr. Tilt, in his notice of Swiss trees, states that "what the landlord of the *Tête Noire* Hotel told him of his woods often applies to other points," viz., that his forests were made up of pines (red and white) and larch. The name of the Hotel at Rosenlaui is (or was) the "Bär," and Brunner, the (whilom) proprietor, is a recognised authority on the botany of his neighbourhood, and his observations on the relative altitudes of Alpine plants are on record. Nevertheless I must adhere to my statement with regard to the larch, that "it occurs only in the Bernese highlands as an escape from cultivation." But, perhaps, Dr. Tilt means the *Hôtel de la Tête Noire*, on the celebrated pass of that name which leads from the valley of the Rhone to Chamouni. That is a very different thing; for the larch is indigenous in the southern Cantons of Valais, Tessin, and the Grisons. There also flourishes on the lower slopes the Spanish chestnut. About Rosenlaui, I noted no other pine but the red species (the white one is more frequent at a lower elevation). Further on, however, towards the Scheideck, it gives place to a variety of *Pinus montana*, the mountain fir, known as pumilio, a weird dwarfish-looking tree; its stems frequently twisted and decumbent, and branches hung with festoons of grey lichen (*Usnea plicata*.) The plantations on Bagshot Heath will hardly bear comparison with an Alpine pine-forest, they are more like those which cover the sandy plains of northern Germany. The mission of pine-trees is to transform a rocky mineral detritus into a fertile vegetable mould, and a sandy soil is not suitable for their development.—*E. de C.*

BUXUS SEMPERVIRENS.—Your correspondent, Mr. Dennis, is right in his conjecture as to M. Guizot's quotation. Asser's words are: "Natus est Ælfred in villa regia quæ dicitur Wanating in illa paga quæ nominatur Berrocscire; quæ paga taliter vocatur a Berroc silva, *ubi buxus abundantissime nascitur*." Asser wrote about 894. In the "glossary" of Ælfric (who died A.D. 1005) our modern English word "box" is given as the A.-S. equivalent of buxus. Boswell, A.-S. Dictionary, gives it as "box," or "boxtreon." But all this will not prove, unfortunately, that the box was not introduced by the Romans, and the name itself may well have come from them also.—*F. Bennett, Walton Manor Lodge, Oxford.*

GEOLOGY.

MARINE DRIFTS IN NORTH WALES.—This is the subject of a paper recently read before the Geological Society by D. Mackintosh, F.G.S. The author remarks on the importance of the marine drift-area, especially as regards its great extent, and the absence, so far as yet known, of similar high-level drifts (between 1000 and 1350 feet above the sea) in continental Europe, Asia, or North America. He lately traced the drift-area two miles farther south than he had done during former explorations, its entire length being little short of five miles. In this paper he gives a detailed description of the numerous exposures of rounder gravel and stratified sand between the north end of Minera Mountain and Llangollen Vale, which, in some places, spread out into large flat expanses, but more frequently assume the form of knolls (frequently in perched positions), which rise up from beneath a covering of clay or peat. He dwells on the probable origin of the knoll-shaped configuration, including the theory of the precipitation of the drift from the stranding of floating ice, and the forcing up of previously deposited drift by the same agency, but inclines to the idea of the knolls having been chiefly accumulated by sea-currents. The author then describes several large areas in North Wales in which he could find no trace of rounded gravel, enters into a consideration of the causes of these driftless areas, and discusses the relative merits of the theory of their having been temporarily occupied by land-ice, and of the theory of non-exposure to tempestuous seas, or seas capable of rounding stones. He then gives an account of the discovery of granite boulders, associated with partially rounded drift, on the summit of Moel Wnion, 1900 feet above the sea (near Aber, North Wales); and endeavours to show that, while they could have been readily transported by floating ice (probably from Scotland, certainly not from Cumberland), the flow of land-ice from Snowdon, according to Ramsay, along the north face of Moel Wnion, must have prevented the access of northern land-ice to the summit of the latter mountain, while land-ice flowing from Cumberland to Anglesey (according to Ramsay) could not have been crossed by land-ice flowing south from Scotland to Moel Wnion. After referring to the outward direction of striæ on the north coast of North Wales, he concludes by giving a summary of facts and inferences. In the discussion which followed, Professor Hughes thought that the drifts of Derwen and Moel Uchaf were to be distinguished from those of the Minera region. The former were in the Bala lake-trough, and striations showed that there were local peculiarities in the glacial phenomena. He thought that the terraces mentioned by the author were connected with a ponding back of the Clwyd. The marine drift ran up to the Elwy Valley far from the sea. The Minera drifts were obviously a coast-deposit. The shells in these beds could not have existed when land-ice came down to the sea from the great mountain districts. Flints were always present, iron-stained, as if derived from flint gravel. He thought it would be worth calculating the percentage of flints in the gravels, tracing them from this district to E. and N.E. He regarded these deposits as postglacial, and thought there was a period of great ice extension, then of a melting back of the local ice during submergence, and that these Minera drifts were the result of the winnowing of the Boulder-clay.

NOTES AND QUERIES.

SCARCITY OF WASPS.—In the co. Wicklow, in the spring before the late frosts, queen wasps were nearly innumerable, but after the frosts they all disappeared, and I have not seen a nest either in the ground or on the trees. Last year both kinds were plentiful everywhere.—*G. H. K.*

OBJECTS IN AQUARIUM.—In reply to query of "Lady Naturalist," in January number, 1882, as to "Objects in Aquarium." From the description, I think the objects in your aquarium are some species of "Cyclops." They are very active, and occur both in salt and fresh water. The body is somewhat pear-shaped and more or less transparent in the middle; the digestive system shows as a dark line. In front are two pairs of antennæ, the first of which are very long. At their base is placed a single median eye (often ruby-coloured in young specimens of freshwater species). Beneath there are numerous swimming legs. Behind the body diminishes and ends with two long tail filaments. Near the base of these may often be seen two dark objects, one on each side of the tail. These are the ovisacs of the female. There is a drawing of a common freshwater cyclops (with ovisacs) in April number of SCIENCE-GOSSIP, 1881.

A LADY'S PET FISHES.—A friend of mine residing in America has communicated to me the following rather remarkable information. A Mrs. Burgess, residing on the borders of one of the most beautiful lakes in America, has been in the habit once or twice a day for a considerable period of feeding the fish in this lake, and my friend was favoured with an invitation to witness this novel feast. She first splashed the water with her hand, when in a moment there were seen approaching from every direction, hundreds of large shiners; then eels, varying in size from one to about three feet in length, swimming very cautiously. Next turtles appeared on the surface, ten, twenty, and thirty feet away, their necks stretched apparently to see whether it is friend or foe who is disturbing the waters. In less than three minutes, these various species had collected directly before her, and as she commenced to feed, the water was fairly alive with them. They take bread directly from her hands, and turtles would allow her to take them entirely out of the water, and while she held them in one hand, they would eat with the greatest voracity from the other. But the eels were the most amusing: there was one she called Quinn, measuring about three feet in length, that repeatedly came to the surface, and would glide back and forth through her hands, and several times she lifted him partially out of the water, but he was careful to keep his head under. He seemed to feel that she would take no undue liberties with him so long as his head was in its natural element, but the moment he saw daylight, he would dart back with rapidity. Another small one about a foot in length, seemed to be particularly fond of her caresses, and could be handled about as she pleased, it being understood though that he was to remain under water.—*Dipton Burn.*

RARE BIRD.—A few days ago a friend of mine was shooting when a bird rose from a wheat stubble that he took for a land-rail, but on picking it up it fairly puzzled every one to name it. Perhaps by a short description some of your readers may assist. Length, tip of beak to tip of tail (if it can be said to have one), 10 inches. Tip to tip of wings 10½ inches; weight, in good condition, 12 oz.; general colour brown, with darker markings, feathers of the back and rump edged with dirty white, belly dusky brown, whole plumage very much resembling a hen pheasant; throat white, eyes pale yellow; the crop contained a quantity of wheat corns and knot grass seed. There is no sign of any spur on the legs, which are rusty brown. It was far advanced in decomposition when brought to me and dissection difficult, but I believe it to be a female, and (open to correction) the Andalusian quail.—*G. T.*

SCARCITY OF LARKS.—Does not the accompanying advertisement in offering "fine healthy live larks" help to account for the gradual disappearance of these delightful songsters? Thousands of small birds, at two shillings a dozen, can be seen exposed for sale in the London poulterers' shops. How can the sacrilege be put a stop to?—*W. T. Greene.*

WILL some one recommend me a book on the British ferns that explains clearly their several characters?—*K. M., Kingsmill, London, W.*

BIFURCATION OF THE FIR.—In further reply to the query of Mr. G. T. Harris, in Number 186, I may say that cases of bifurcation of the fir are by no means unusual in this neighbourhood. I have seen many instances of it on various kinds of fir. Some notable examples may be seen on the Dublin road about two miles from Enniskillen, in the demesne of Castle Coole, the seat of the Earl of Belmore.—*J. H. H.*

WAGTAILS.—During the spring this year I was aroused by something tapping at my bedroom window and on getting up I found it was a wagtail; the poor thing kept at it for several days—apparently wearing itself out. I opened the window to see if it would come in, thinking its mate might have fallen down the chimney, but I don't think it ever came in. Of course the servants said somebody was to die; but though I had a very severe illness soon after, I am still in the land of the living. We could only see the one bird. What could have been the reason for the poor thing doing so? I always thought the wagtail was too shy a bird to come near windows.—*W. R. T.*

PARROTS.—We have a small Australian parrot, which came to us when about six months old, having been taken from the nest when quite young. It is always supplied with water, and drinks, but not frequently. It takes a bath every day in warm, and twice a week, at least, in cold weather, and appears greatly to enjoy it.—*M. E. Pope.*

SPRING FLOWERS.—I observed the male flowers of the hazel, and the female flowers of the filbert, fully open during the second week of January. The male flowers of the filbert were opening during the third week of January.—*M. E. Pope.*

WHITE HEATHER.—Last July, whilst walking along the road between Douglas and Laxey (Isle of Man), I came across a patch of heather (*Calluna vulgaris*) the flowers of which were quite white, and within a yard or two of it, grew plenty of the common purple heather.—*G. H.*

VARIETY OF WOODCOCK, &c.—A beautiful variety of the woodcock (*Scolopax vusticola*) was recently shot at Thornton, near Pickering, Yorkshire, and was sent to Mr. Helstrip, taxidermist, of this city, for preservation, where I had the opportunity of examining it. The bird was very lightly coloured with cinnamon and white, a few deep dashes of black showing conspicuously here and there. The head alone was of the normal coloration. The woodcock seems to be frequently met with as a *lusus naturæ*, a white variety I had in my collection being recorded in SCIENCE-GOSSIP a year or two ago. I may also mention that several specimens of the great gray shrike (*Lanius excubitor*) have come under my notice, being killed in this part of Yorkshire during the present winter.—*C. D. Wolstenholme.*

SETTING LEPIDOPTERA.—I have lately been relaxing a great many Lepidoptera, some which I have had in papers, and others I wish to alter from the "English" to "Continental" style of setting. But I find that after the insects are again taken off the setting board the wings nearly always "spring" out of place. This has happened with insects which I relaxed over wet sand for two and even three days, and which I dried in a warm place for three or four days. Would your readers kindly suggest any remedies they know as soon as possible? I should be especially glad if they would write to me direct, as I am wanting to reset some more insects.—*G. H. B.*

Audacity of a Hawk.—One day, about the middle of last September, a gentleman was out partridge shooting. A bird got up, at which he fired; and as it fell, a sparrowhawk swooped down, and carried it off. About half-an-hour afterwards, the irate sportsman saw the hawk just above his head with its prey in its claws. He gave it both barrels, and brought it down. I saw the partridge which was minus the head, and a large portion of the breast. The hawk was a fine bird, in beautiful condition, and quite young.—*A. J. M. L.*

Tame Rat Catching Mice.—The door of a rat's cage of mine having been left unfastened, I was surprised in the morning to find a dead mouse in the cage, and another outside. The next night I let the rat out, and in a short time he caught a mouse, which had been running about the room, and deposited it in his cage. I often leave the rat out all night, and during his nocturnal rambles he has caught eight mice. The dead mice are taken out of the cage in the morning, and sometimes a piece of the head is gone, at others they are untouched. The rat is a buck, and piebald; it is fed on bread, oats, maize, &c., but no meat.—*Walter A. Pearce.*

Notes on the Arbutus.—Since writing my previous notes, I have been told of a giant arbutus to be seen at Dinish, one of the islands which separates the Middle from the Lower Lake. I went to see it, and found it even larger than I had been led to expect. It is nine feet in circumference, about a yard from the ground, and cannot be much less than sixty feet in height. We are so apt to think of the arbutus as only a shrub, and this is I believe such an uncommon size, that I should be glad if any one would tell me if they have ever met with a larger. The caretaker at Dinish much amused me with a very graphic description, in truly Irish style which I regret I cannot reproduce, of the wonderful cures for intestinal worms effected by eating the arbutus berries. This is quite new to me, and I should be glad if any confirmation of this statement can be supplied. I notice the bark on the trunks of many of the trees has a curiously twisted appearance, seeming to ascend in spirals like the strands of a rope; and instead of peeling off the tree, it rubs off in the form of scales.—*John Rasor.*

Dreissena polymorpha.—It is pleasant to know, through your kind correspondent Mr. Gardner, that this shell is extending its distribution in the British Islands. Collectors should take note of this, for I have little doubt it might be discovered, with patient searching, in many docks and tidal estuaries, or in the canal basins, joined with tidal rivers. Only recently, it has also been discovered in the River Weaver Canal, at or near Weston Point, in the Mersey Estuary. It is one of our prettiest shells, still it can scarcely be confounded with any other mussel, and especially so with the Anodonta: the banded markings, well expressed by its local name, zebra mussel, will guide the young collector in his search.—*R.*

Acherontia Atropos.—I should feel greatly obliged if any reader of the Science-Gossip will kindly furnish me with the *modus operandi* under the following circumstances. During September, I had the good fortune to secure four beautiful caterpillars of the death's-head moth, and being exceedingly anxious to rear them, I exercised every precaution, and had the satisfaction of seeing them all safely assume the pupal state, and in about six weeks, two of them came out perfect and fully developed—indeed, finer specimens I never saw; but, strange to me, two still remain in the pupal state, though they have received the same treatment, and have been subjected to like conditions in every respect. To-day they are as lively as any one might wish them to be. Now I should like to know if they will ever come out of their pupal envelope, or if I could by any means force them out, as the moth is rare in this district.—*I. Wilburn.*

Mason-Wasps.—In answer to query of F. W. S. about mason-wasps, I find two species are mentioned in "Museum of Animated Nature," also in "Insect Architecture." One is a common species of solitary mason-wasp (*Odynerus*, late). Mr. Rennie says he saw one of these wasps excavating a hole in a hard brick of a wall, which excavation took her two days to accomplish; it took her two more days to line it with a coating of clay, to deposit her eggs, and as he supposes, imprison a few paralysed spiders or caterpillars for the larvæ to feed upon. The entrance was then closed up with a thick layer of clay. The other species (*Odynerus mucrarius*, late) constructs singular burrows in hard sand-banks, to the extent of two or three inches, and that with great rapidity. This wasp stores her cell with living caterpillars, fixed together in a spiral column, as food for the larvæ.—*Clara Kingsford, Canterbury.*

The Holly.—In Northumberland the holly is divided into two kinds, the he and she hollies. The former is distinguished by having prickly leaves, while in the latter they are unarmed or nearly so. When gathered in a proper manner, and at a fit hour, the she holly engenders dreams concerning that all-absorbing object, a future husband or wife. To assure this the leaves must be gathered on a Friday and at midnight by parties, who, from their setting out until next day at dawn, must preserve unbroken silence. The leaves are to be collected in a three-cornered handkerchief; and after having been brought home, nice leaves must be selected and tied with nine knots inside the handkerchief, and then put under the pillow. A dream worthy of credit is the result. "He lies never, but when the Hollen is green," is a Scotch saying of a habitual storyteller.—*H. G. Glasspoole.*

Hawk feigning Death.—During the first week of this year, whilst a little boy, about four years old, was playing close to the window in the hall of a large shooting lodge near here, a kestrel-hawk dashed right through the glass into the room. It is difficult to decide whether it intended to strike him or flew at the reflection, on the glass, of a bird passing the window; the latter is the gamekeeper's supposition. The hawk was caught in the room and put into a wire meat-safe, where it refused to eat. The next day, whilst two or three people were watching, it suddenly flew up to the top of the safe and seized the front wires with its claws; after perching there for a short time it gradually allowed itself to slide round until it hung head downwards, to all appearance dead. Unfortunately for itself it did not close its eyes, the brightness of which caused the lookers-on to suspect deceit. They cautiously opened the door and immediately Mr. Hawk "resurrected" and made a dash at the door, but failed to make his escape. Although only a last year's bird it had to be killed, as it continued to refuse food.—*Thomas Winder, Sheffield.*

Ova of Dragon-flies.—Can any of your readers give me information as to the best method of procuring ova of dragon-flies?—*A. M. P.*

HEATHER, &c.—If J. W. and C. S. G. (in the February No.) strolled over the moors of Devon and Cornwall, they would certainly find quantities of white heather, but always growing among the normal colour. It is frequent about Lynmouth, on Dartmoor and Exmoor, &c. I have a fine specimen of *Erica tetralix* in my herbarium gathered at Trentishoe; the leaves were of a lighter green, but in no cases were the flowers inferior. It cannot be the soil or situation which produces the white flower, as it is always found growing with the normal colour; it is the same with *Scilla nutans*, *Geranium Robertianum*, &c.—*W. B.*

CORMORANTS.—I have to thank the Rev. H. W. Lett, M.A., for his answer to my query relative to cormorants breeding about inland lakes; and also other correspondents for their interesting notes about these birds. Though previously unaware that they built in the localities referred to, I knew that they were frequently to be met with far inland, having often observed them myself many miles from the sea, especially in the winter season. Indeed, they are at this time of the year quite a common sight on Upper Lough Erne, between 30 and 40 miles from the nearest salt-water.

SEA-GULLS (vide p. 283, No. 204) are also not infrequent visitors, some being observable, not only during, or immediately preceding a storm, but almost any day of the year. I have in my possession a fine specimen of the lesser black-headed gull, shot in August 1880, near Clunish Island, Upper Lough Erne, about 20 miles, as the crow flies, from the nearest part of the coast.—*F. H. H.*

SCOTT ON THE HAREBELL.—Sir William Hooker in the "British Flora," calls the *Campanula rotundifolia*, the harebell; and quotes Scott's lines, "E'en the slight harebell," &c., in confirmation. I should consider no man's opinion superior to that of the late Director of Kew. On the other hand, in the "Treasury of Botany," edited by Lindley and Moore, we find "Harebell (*Hyacinthus non-scriptus*.)" Then, in the "Illustrated Handbook of British Plants," by A. Irvine, the genuine name harebell is only used for *Campanula*. Babington used only hairbell; this I regard as a distinction without a difference. Grindon, in the "Manual of British Plants," employs harebell for *Campanula*. We now cite Sir Joseph Hooker and Bentham respectively, who both term the *Campanula*, harebell. Here we have the evidence of *five* against *one*. Surely this is overwhelming; why need we any further discussion? I thought, in my simplicity, this matter had been settled years ago, in the pages of the "Naturalist," where much good temper was lost, all for nothing.—*R.*

PARROTS AND THEIR FOOD.—We have a green Indian parrot, able to repeat numerous sentences pretty distinctly, to sing a song, whistle a tune, &c. We have now had it about five years, and during that time its principal food has been bread soaked in sweetened milk and tea, for its breakfast, and buttered bread for its other meals. In addition to this we often give it a piece of raw apple, turnip, &c. Upon this diet it thrives amazingly. We give it no water. For the last year or two it has received a tepid bath every morning, summer and winter, which it enjoys immensely. I quite agree with your correspondent, "J. H. M.," that animal food causes it to pluck out its feathers, probably on account of its exciting properties acting on an animal which, in its natural state, is accustomed to live almost wholly on vegetable food.—*J. A. T.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

MRS. U. (Surrey).—We believe it is an aberrant form o *Carex glauca, L.* To clear up any doubt, we will submit it to an authority on the Carices, and let you know the result.

H. C. B. (Wandsworth). — Thanks for the microscopic material.

J. A. (Edinburgh).—The mosses are: No. 1, *Hypnum velutinum*, 2, *Polytrichum commune*, 3 and 4, *Tortula muralis*, 5, *Mnium hornum*, 6, *Hypnum cupressiforme*, 8, *Polytrichum commune*; the rest not being in fruit, we cannot determine. Would you kindly send other specimens?

MISS W. (Maidstone).—The Pezizæ are not confined to any one kind of wood. We can only detect the moss (some species of Hypnum) in your letter. A useful volume is Edwin Lees' "Rambles;" this would help you, and it is very trustworthy and interesting.

J. E. (Leeds).—It is a form of *Polystichum lobatum*, a fern differing widely according to locality.

A. W. O. (Windsor).—So far as we can see, from a hasty examination, they are correctly labelled, but they are puzzling species.

F. H. SMITH.—You cannot get a more comprehensive book on the subject you name than Sir Joseph Hooker's "Students' Flora of the British Islands," published by Macmillan at 10s. 6*d.*

H. D. BARCLAY.—The question as to whether the earth *lives* or not is a very ancient one, and we cannot see what benefit would be derived from the discussion of such a subject when so many of greater and more practical importance are demanding attention.

J. H.—A correspondent has kindly informed us that the Rev. H. N. Ellacombe has written an exhaustive book, called "The Plant-lore of Shakespere."

S. BRENAN.—Life has not been discovered on a meteoric stone, nor is it likely it ever will be, seeing how fused and vitrified the outside of all meteoric stones are, through the heat produced by friction in passing through the atmosphere before they reach the earth. The idea that life might have originally been introduced upon one planet by meteoric agency was first mooted by Sir William Thomson, in his Presidential Address before the British Association at Edinburgh in 1871. Since then an ill-informed German doctor of medicine thought he had discovered *fossils* in meteoric stones, but this has been completely disproved.

J. SMITH.—Van Beneden's "Animal Messmates," published by Kegan Paul & Co., price 5*s.*, will be a good commencing book, as it will introduce you to the true nature of parasites. Denny's "Monograph of the Anopluridæ" is the most exhaustive illustrated work on the subject we have.

H. R. ALEXANDER.—We are not in the habit of pointing out any microscopic maker's name in particular to our readers, but we advise you to write to any of the makers you mention in your letter, and tell them what you want and the price. They are all good and honourable men. You may obtain Stark's "British Mosses" (secondhand) at such scientific booksellers as W. Wesley, Essex Street, or W. P. Collins, 157 Great Portland Street. Tripp's "British Mosses," 2 vols., containing several hundred figures, may generally be had for about £2. Dr. Braithwaite's work now issuing (see notice in our botanical column) would be the best work you could obtain.

C. DOWSON.—You will find the fullest information as to the development of saw-fishes in Dr. Gunther's recently-published "Study of Fishes." It is very probable that the fish to which your snout belonged might have been longer than we stated.

A. E. B.—You cannot do better than join the Essex and Epping Forest Naturalists' Field Club. It is an excellent society, publishing its transactions, and doing good scientific work.

M. C. W.—Dr. Nicholson's monograph work on fossil corals might be of use to you. You will find in the vols. of the Palæontographical Society descriptions and figures of most of our fossil corals, from the Silurian upwards, described by Haime, Milne-Edwards, and Martin Duncan. Professor Phillips's "Geology of Yorkshire" (just republished) gives illustrations of most carboniferous limestone fossils. For plants of Coal Measures see Lindley and Hutton's "Fossil Flora."

Animalculist, get "Ponds and Ditches," by Dr. Cooke, price 2s. 6d., published by S. P. C. K. Society. Also "A Thousand Objects for the Microscope," by the same author, published by Warne, price 1s.

EXCHANGES.

Wanted, Hooker's "Student's Flora of the British Isles," for exchange.—W. Simpson, 11 Scholes Street, Cheetham, Manchester.

Wanted, second-hand monocular microscope with one-inch, or half-inch, and quarter-inch objectives, value about £3. Offers.—H. Evans, 103 West Street, Grimsbury, Banbury.

Wanted, to exchange a revolving double-nose piece for two objectives, new, for pine object cabinet, the specimens to lay flat in trays with divisions.—Rex, 108 Broomgrove Road, Sheffield.

For Prichard's "Natural History of Man," 2 vols., 62 coloured plates, and 100 wood engravings, Bailliere, 1855, what offers? Set of Science-Gossip, "Intellectual Observer," and Gosse's books wanted.—B., 9 Royal Terrace West, Kingstown, Ireland.

"Annual Reports and Proceedings of the Liverpool Geological Association" exchanged for those of other societies.—O. W. J., 8 Queen's Road, Rock Ferry, Cheshire.

Wanted, to exchange a number of articles, viz.:—Butterflies in box, seventy-five characteristic rocks and fossils, books, &c. List on application to F. S. Atkinson, Thornbury House, White Cross Road, Hereford.

Will give British marine or land shells in exchange for British butterflies, or other shells.—S. C. Cockerell, 11 Ethelbert Road, Margate, Kent.

Offered, British land and freshwater shells and some fossils in exchange for foreign postage stamps (rare sorts from Persia and Mauritius, &c., required).—F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

A collection of foreign shells, all named and neatly mounted on cardboard, 140 specimens, comprising about 90 species, exchange micro slides or material.—D., The Beeches, Circus Road, N.W.

Slides of lead formate, ammonium chlorate, and nitrosalicylic acid, neatly mounted in Canada balsam. What offers in slides? Vegetable tissues preferred.—B. Piffard, Hill House, Hemel Hempstead, Herts.

Wanted, good specimens of *Potamogeton nitens*, *P. filigonius*, and long-leaved forms of *P. pusillus* from Scotland. Other Potamogetons, rare British plants, or Characeæ in exchange.—A. Bennett, 107 High Street, Croydon, Surrey.

Science-Gosssip, unbound, 1878, 1879, 1880, 1881. What offers?—John Kitchin, Grosvenor Place, Parliament Street, Nottingham.

A variety of microscopical photographic slides to exchange for others—botanical, entomological, &c. They must be good preparations.—J. P. Hiller, 38 Hornsey Street, Holloway.

Wanted, a copy of Gray's "Birds of the West of Scotland."—Rev. J. A. Ewing, Westmill Rectory, Buntingford.

Wanted, nests of goldfinch and gold-crested wren.—Alex. Foster, Rodger Street, Anstruther, N.B.

Offered, Walter White's "Holidays in Tyrol," Duke of Argyll's "Iona," Weld's "Two Months in the Highlands, Orcades and Skye," Jenkinson's "Guide to North Wales." Wanted, good books on microscopy.—T. H. Buffham, Connaught Road, Walthamstow.

Wanted, impressions from seals, &c.: also specimens of curious natural substances used in the arts, sciences, &c. Can offer impressions from seals of historical interest, &c.—W. H. Tunley, Albert Road, Southsea.

For palate of limpet or skin of starfish send stamped envelope and some other interesting object.—M., 38 Park Road, Clapham.

Wanted, English silver and copper coins, medals, war medals or tokens; exchange, fossils or natural curiosities.—F. Stanley, Margate.

Wanted, living specimens of *Helix pomatia* and other southern Helices, also *L. stagnalis* and *P. corneus*. Exchange slides or shells.—J. T. Lightwood, Lytham.

Fossils from Thanet sand, London clay, &c., in exchange for old china figures or dishes.—Arthur Leonard, 6 Clifton Gardens, Margate.

Wanted, Dolgelly and Isle of Für deposits, also guanos rich in diatoms. Will give in exchange other deposits, or first-class micro material or well-mounted slides.—G. Tempere, Storrington, Sussex.

Foreign fossils (jurassic, eocene, miocene) in exchange for British fossils or microscopic objects. List of 200 species.—Dr. Rudolf Haeusler, F.G.S., &c., Dedham, Essex.

Foraminifera, from miocene and eocene of Austria, Italy, France; large specimens of *Spongilla fluviatilis*, &c., offered in exchange for microscopic objects (foraminifera and diatoms preferred) or British fossils.—Dr. Rudolf Haeusler, F.G.S., &c., Dedham, Essex.

Wanted, British marine shells, particularly northern forms. Specimens of several orders of marine zoology, also preparations for the microscope, offered in exchange.—Lists to E. Lovett, Holly Mount, Croydon.

"Nature" for 1881, complete, in twelve monthly parts. Wanted, micro slides or offers.—R. W. P., 168 Clanghton Road, Birkenhead.

Wanted, a good microscope; will give a five-guinea one and five vols. of "Illustrated Travels," cost 90s., for a better one.—A. Draper, 275 Abbeydale Road, Sheffield.

Wanted, shells from the Cape, Ceylon, and Fiji islands, also a few specimens of double reflecting spar crystals and labradorite (in the rough or polished), agates and other polish specimens, or quartz crystals, for British marine and freshwater shells, polish specimens of Devon corals, spars, &c., Haldon greensand, gault, lias, red crag, mountain limestone, silurian, and other fossils; also thin sections of Devon corals, beautifully finished for the microscope, worth from 3s. to 24s. per dozen.—A. J. R. Sclater, 23 Bank Street, Teignmouth, Devon.

Science-Gossip for 1866, 67, 68, 72, 81, for offers; also first-class air-pump by Griffin. What offers in micro apparatus.—A. Alletsee, 11 Foley Street, Langham Place, W.

Fine Secondary and Tertiary fossils to exchange for works on astronomy or micro-photos.—"Science," 165 White Ladies Road, Bristol.

For exchange for a good geological cabinet or standard books, S. V. Wood's "Crag Mollusca," complete in one vol.—W. Rose, Abergavenny.

Wanted, for exchange, living zoophytes. Communicate first with C. H. Schill, Fairoak, Didsbury, near Manchester.

Will give in exchange for unstained well-mounted slide of *Trichina spiralis* a receipt for ink for etching or writing upon glass.—A. Smith, Laboratory, Essex Road, London.

Wanted, correctly-named British and foreign recent shells in exchange for 350 species of dried ferns, including 30 genera, correctly named; also 20 species of eocene shells from Paris basin, named.—S. E. Richie, 2 Longley Road, Tooting, London.

Wanted, deposits containing diatomaceæ, polycystina, or foraminifera, in exchange for well-mounted slides of podura, diatomaceæ, polyxenes, &c. List sent.—C. S. Bouttell, 3 Chestnut Villas, Woodford Road, Forest Gate, Essex.

I have still some slides and material of *Solanum auriculatum*, with stellate hairs, from Mauritius, for exchange. Send lists to Rev. A. C. Smith, St. John's Vicarage, Crowboro', near Tunbridge Wells.

Miss Meyrick will be obliged if a gentleman who offered to send her water-plants last year from Cork will send her his address. She will give rooted rhizome of Killarney, fern, or other exchange to any one for water-plants.—Laurel Ville, Ballybrack, Co. Dublin.

Well-dried specimens wanted of many of the less common British plants; offered, 3 b, 41, 130 b, 317, 325, 561, 723, 841 b, 901, 1335, 1519, and others (L. C., 7th ed.).—E. F. Linton, Sprowston Vicarage, Norwich.

BOOKS, ETC., RECEIVED.

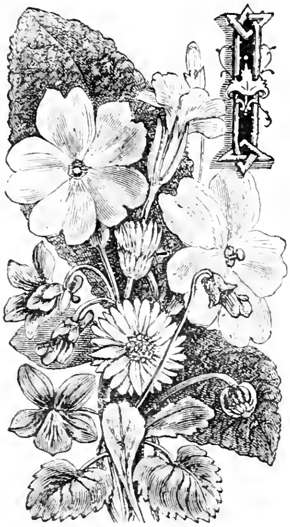
"The Honey Ants and the Occident Ants." By Henry C. McCook, D.D. Philadelphia: J. B. Lippincott & Co.

"Trance and Muscle Reading." By G. M. Beard, M.D. New York.

"Land and Water."
"Midland Naturalist."
"Northern Microscopist."
"Aunt Judy's Magazine."
"Journal of Applied Science."
"The Natural History Journal."
"Natural History Notes."
"American Naturalist."
"Canadian Entomologist."
"Botanical Gazette."
"Good Health."
"Annual Report of Entomological Society of Ontario.
"Cosmos: les Mondes."
"La Science pour Tous."
&c. &c. &c.

Communications received up to 11th ult. from:—C. F. W. T. W.—E. H. S.—C. H. B.—W. S.—F. C.—J. A. T.—E. L.—R. A.—J. L.—G. D. B.—E. A. G. D.—R. H. N. B.—E. W.—B. P.—C. N. R.—J. S.—E. P. D.—J. S.—A. N.—C. G.—F. C.—A. B.—E. T. M.—J. A. O.—G. H. B.—W. K.—F. B.—M. A. H.—F. P. D.—A. H. C.—R. J. W.—H. B.—F. H. P.—H. H. C.—M. E.—A. M. P.—W. T. G.—E. D.—E. T. D.—T. D. K.—S. C. C.—E. J. T.—O. W. T.—H. H. D.—S. A. B.—M. E. W.—T. I. N.—F. A. G. S.—G. R. R.—F. B.—C. S. G.—F. H. A.—T. M. R.—T. R. J.—F. S. A.—I. H. W.—F. M. H.—Dr. R. H.—E. W. W.—W. H. B.—R. W. P.—E. H.—A. B.—A. F.—J. W. C.—H. P. M.—T. H. B.—A. J. R. S.—H. W. K.—W. S.—W. H. T.—R. E. G.—F. S.—J. L.—R. L.—C. E. R.—J. T.—G. A. Y.—H. R. A.—J. A. W.—P. Q. K.—M. C. W.—C. D.—W. H.—J. P. H.—A. D. M.—W. J. W. S.—A. W.—W. B.—E. F. L.—A. E. B.—F. H. S.—M.—D. R.—S. E. R.—A. C. S.—N. L. B.—A. A.—G. D.—H. L.—W. R.—A. D.—E. L.—C. H. S.—J. S.—C. S. B.—A. S.—W. G.—R.—&c.

THE MICROSCOPE AND FINE ART.



IT is obvious from Mr. Suffolk's paper, in the March number, that he has not quite caught the idea of a microscopical drawing, as a work of the highest possible finish, or, as a graphic delineation where the subject has been laboriously worked up, like a miniature, to a point, when it becomes "art." The old notion, of equidistant lines ruled on glass, placed in the focus of an eye-piece, to correspond with lines drawn on the paper to guide the position of an object, is practical to the extent of enlarging a subject, even to the dimensions of a diagram, or for measurements—but, for a highly-finished painting of some semi-transparent or opalescent subject, such a method of fixing positions cannot be employed—the pencilled "squares" on the paper are difficult to erase, and you can never permit any "rubbing out" on paper designed for tender drawing and delicate colouring—so, for preliminary outlines we must fall back upon the old Wollaston Lucida giving double reflection, the sketch coinciding with the object, when afterwards seen by direct vision, which the delusive neutral glass tint reflection does not effect.

It is possible, the style of drawing suggested in the January number was not sufficiently explained—the plates, illustrating the works of Owen, Quekett, Bowerbank, and the earlier volumes of the society's Transactions are familiar to the writer, who can therefore appreciate the value of the purely scientific work both with the pencil and the graver; but, beyond this, there is microscopical painting, something in advance of technicality, in fact, touching the domain of fine art.

There are at least three well-defined characteristics of microscopical drawing, the purely scientific representations of tissues, when powerful objectives are, with rare skill, used to explore as it were the very penetralia of organic structure; then a style, most engaging, rapid, decisive; memoranda, if you will, but vastly useful, the result of a plan young microscopists should adopt, of having constantly by the side of the instrument a block of drawing or cartridge-paper, and boldly, without hesitation or the aid of lucida, jotting down and washing in with colour things unexpectedly turning up, generally life. The drawings which Mr. Bolton distributes with his tubes of organisms are excellent examples of this bold and ready style of sketching; in this way living desmids may be watched and noted, the subdivision of micrasterias may be observed at intervals, and recorded in a rough, but not the less graphic way, and such are valuable as being direct impressions of the mind. Drawing as an aid to investigation has been neglected. It is positively certain that many phases in the life history of minute plants and animals have been seen and passed over, well deserving the record of even a rough sketch. No microscopist with any idea of building up and retaining an experience should work without either pencil or pen, but beyond this tentative work is finished "art." Why should not the microscopist in such a matter emulate the best painters of "still life"? Such transcripts from the instrument may not reach the status of "scientific value," but these efforts do not degrade its use, the polypidum of a zoophyte must surely be as elevating and as interesting a subject as a peacock's feather, a jay's wing, or a cut lemon—but personal feeling has its influence, for no occupation can be more absorbing or more fascinating than obtaining fair representations of fine objects as seen through the magical tubes.

It may be said—that every one has not the ability to do, or to produce such things! But, it is impossible to conceive any mind, led by natural inclinations to contemplate the revelations of the microscope, destitute of taste, or of an appreciation of beauty of the highest order. The culture of the eye, as exercised by the use of the instrument, is the very touchstone of art sensibility; and young beginners may be comforted with the solid fact that practiec and perseverance only are required. The management of light, the degree of amplification required to see an object to the best advantage, even the use of the drawing materials may be self-taught; possibly a struggling young microscopist may learn more by half an hour's direct teaching than he could gain in a month's groping by himself, but in the end, experience is the best master. A temptation to avoid is drawing upon the imagination; by this is meant repairing broken or distorted parts, imagining what might but never could be—building up a perfect diatom from a fragment. Dr. Greville in 1860 was very clever at this sort of work, no one could ever hope to see half the objects depicted in his plates; better far draw imperfections, if they teach anything, and often a broken or misplaced tissue affords a very valuable lesson. In microscopical drawing there must be no exaggeration. It is sufficient to observe, study, and convey to paper the actual thing before you. Favourite subjects are the various parts of insects, especially the head and its appendages. How best to see them? Certainly not distorted between flattened glasses. A very popular object is what is called the "foot" of dytiscus; before the days of binoculars, this was fairly well prepared by Topping—in a perfectly flat condition. Considering that its salient point is the beauty of the "cups" it was simply unintelligible until seen as an opaque object, fresh from the insect, gummed to a cork slide—without covering glass. It is a great advance that our modern preparers, with admirable skill, now mount parts of insects in fluid, without crushing them out of knowledge into an unmeaning mess. The young microscopist might here be advised to limit the contents of the "cabinet" to purely typical slides or those requiring actual preparation. There can be no advantage in admitting anything dried and desiccated, which can be procured fresh and living at each recurring season—the woods, the garden, and the stream are the best cabinets. There seems no limit to the appetite for slides; even *Volvox globator* has been "mounted"!

For drawings, fresh objects are desirable: lichens, fungi, eggs of insects, anthers and pollen of flowers, seeds, all parts of insects never look so well as when simply attached with a smear of gum to a slide of cork, and uncovered, illuminated with the speculum. Take a subject as a type, say the head of *Salticus scenicus*, a common ground spider; it has grand eyes, in three series. The front row on the edge of the cephalothorax, or forehead, reveals four "oculars" touching each other in a parallel line—the largest pair in the middle. The head should be arranged as soon after death as possible; front view in this position, it seems "actually leering at us" with weird and ghastly reality. To paint this portrait is worthy the best effort of the greatest artist, for nothing can be finer in character or colour; with a little management it might be arranged to be seen alive. This is a good lesson, as it proves that subjects for drawing are very accessible. It is worth while, or the purpose of good work to remove the covers of prepared opaque objects, especially when there is any tendency to clouding on the under side of the covering glass.

Of pigments, opaque colours should be avoided, for instance, Vandyke brown* is difficult to manage, and unsuited for delicate work. A colour or tint often required for microscopical work is the beautiful rich tone of the chitinous parts of insects; this can be made by an admixture of burnt and raw sienna, warmed with carmine, or rose madder. When a wash of this is thoroughly dry, and its inequalities lightly stippled with Payne's grey, the exact *complexion* of the insect, making allowance for lights and shades, will be obtained. In all water-colour work, a rule to remember is, never go over a wash a second time until the first be perfectly dry; this applies also to stippling. Stippling should show granulation, which is lost if the touches are allowed to run into each other.

E. T. D.

Crouch End.

A MORNING'S STUDY OF A FISSURE NEAR TENBY.

TENBY to the naturalist is the queen of Welsh watering-places! Nature in this part of Pembrokeshire deals out her gifts with no niggardly hand. The cliffs and adjacent country are clothed with beauty and variety; the botanist and zoologist find there a wide field for their labours. The geologist meets with still more encouragement, for Nature here exposes to his eager ken several slices, as it were, of her different formations, ranging from the silurians up to the coal measures, each of which is a repast that will more than satisfy a life of application. Organic remains are not uncommon, from the ferns of the coal down to the trilobites of the silurian rocks. The waters that bathe the coast contain marine life in abundance; treasures, some of which are hoarded up in the cabinet of the shell-collector, or are minutely examined by the microscopist, others of which are dissected with ever-increasing knowledge and pleasure by the student of biology. On one side of Tenby runs a line of sand dunes—ever-shifting bulwarks raised by the inconstant wind against the siege of ocean—on which are to be found many beautiful land mollusca. Here and there their empty tenements have been gathered together by the wind, in time to form groups of fossils in sandstone—maybe to be disturbed in their quiet resting-places ages hence by future palæontologists!

There are human landmarks as well. Cave dwellings show that pre-historic man was no stranger here,

* Vandyke brown is made from ground-up Egyptian mummies. The great colourman of Long Acre uses up an individual every few months.

and dotting the face of the country like grey specks, are fragments of ancient castles and abbeys,

> "Where Ruin dreary dwells:
> Brooding o'er sightless skulls and crumbling bones.
> Ghastful he sits, and eyes with stedfast glare
> (Sad trophies of his power where ivy twines
> Its fatal green around) the falling roof,
> The time-shook arch, the column gray with moss,
> The leaning wall, the sculptur'd stone defac'd,
> Whose monumental flatt'ry, mix'd with dust,
> Now hides the name it vainly meant to raise." *

But the title of this paper reminds us that we have no time to dwell longer on the many resources of favoured Tenby; we must hasten on to Giltar Point, stretching out to the west of the town, while the tide is on the ebb, or our morning's work will be spoilt, and our homely dinner unearned.

The long, low land that appears exactly opposite is Caldy Island. The cliffs where we intend to linger for an hour or so are formed of the mountain limestone, which comes in contact with the old red sandstone about a mile farther along the coast. In one part of the projecting cliff, and near some beds that have been quarried for building stone, there is a fissure that the ordinary observer might even fail to notice, but fraught with interest to the student of geology. Let us examine this fissure, and see what facts we can glean from it, and what inferences we can draw from our observations.

On one side of the fissure, or lining its "footwall," there is a vein (see fig. 65), from 2½–4 inches thick, that appears to be filled with massive calcite. But a line is seen to run roughly down its centre, and a closer examination shows that it is formed of large rhombohedric crystals of that mineral very imperfectly developed. A few feet below the surface of the cliff a small vein branches off from the larger one, as shown in the sketch.

Others also branch off from it, and some small white veins run through the "country rock," more or less parallel with it, and a few are seen to run in a cross-direction, occurring here and there in bundles. The thickness of the whole fissure varies from 2–2½ feet. It widens out above and below. From A to B it is filled with angular fragments of limestone and red earthy matter. From B to a short distance below the level of the beach the contents have been washed away by the sea; in fact, the action of the waves at high water has formed an underground tunnel between this spot and the next cove. Lines appear indistinctly running down the centre of the vein or fissure, more or less parallel to the sides; hence the contents seem to have been arranged in layers. The fissure runs or courses N.W. b. W. or about 35° W. of N., and it is visible on the opposite or N.W. side of the cove. It dips northward about 66°. The walls below B are in parts extremely well defined, and are coated with recent incrustations of calcite, in small and imperfectly-developed crystals.

Several feet to the N.W. the fissure is only from one foot to 14 inches wide. The walls here are better defined, and the inclination is as high as 75½°. The vein of calcite is still present on the foot-wall, and is 2½ inches thick. Miners have observed over and over again that when a lode is nearly vertical, or, in other words, when the "hade" is very slight, it is more likely to be narrow, the walls are pretty sure to be better defined; and, what is of more importance still, the ore will be more solid and more concentrated. This general law, then, has been followed in the case of our fissure.

If, leaving the fissure for a moment, we examine the limestone beds, or surrounding "country rock," we shall find them to be of very variable thickness, from a few inches to several yards. We shall discover, moreover, that these beds course about at right angles to the direction of the vein, or N.E. b. E. (i.e. about 55° E. of N.) and that their dip is from 53.5–57.5° towards the S.E. (see plan, fig. 66). Now the fissure is roughly parallel to the tidal lines left at high and low water; it runs across the jutting cliff, which is formed of beds striking at right angles to the tidal line.

The origin of this fissure is now evident. It was clearly produced after the solidification and upheaval of the beds, and must have been formed comparatively very recently, when, probably, the projecting portion of the cliff was continuous with that on the N.W. side of the cove.

By the slow undermining action of the sea, aided by atmospheric influences, the portion C of the cliff gradually broke away from D. At first a mere crack or chink must have been produced in the rock. This crack was enlarged by the action of gravity until it became a vein two or three inches thick. This vein was subsequently filled by calcite, dissolved out of the limestone beds above. The fissure was then enlarged, and gradually filled with débris from above, as proved by its present structure, and by the lines running more or less parallel with the walls. This fissure cannot extend to any depth; it is superficial, and due only to sea-action. It has been propagated and subsequently filled from above downwards, and not from below upwards, and seems to resemble those fissures that are termed "gash veins" by practical miners.

The veins on the outside of the hanging-wall of the fissure will well repay examination. A number of small ones are seen running more or less parallel with the large fissure; as many as six can be counted in the space of one foot. A few veins, as has been already mentioned, run across, almost at right angles to these. Here is a case of part of an encrinite stem having been twice split and thrown out of its plane by minute fissures (fig. 67). Here, again, two encrinite stems have helped to fill up a fissure; they

* These lines were written by—may I venture to say?—that too-much abused poet, David Mallet. They occur in the first canto of his 'Excursion,' parts of which were fully appreciated by the poet Thomson.

are about half an inch apart, and are in the midst of a very recent incrustation. The edges of the fossils are rough and angular (fig. 68), proving that they have been knocked about somewhat before finally resting in peace in this vein. Minute fissures are often seen crossing these fossils without throwing them (fig. 69). In some parts of the rock so many minute veins cross each other as to form a regular network. Let us note an interesting instance in which a vein of brown-spar has thrown two others of white-spar (fig. 71), telling us, in clear characters inscribed on stone, that the former was propagated after the latter.

AB (fig. 65) is probably the origin of these pink layers. They are noticeable even in the vein on the side of the large fissure. Whence came this colouring matter? It was probably washed down from the old red sandstone, for, although the latter is really the older formation, at its junction with the mountain limestone at Skrinkle Bay—a mile or so from here—it actually overlaps the limestone, having been upheaved, together with the beds above it, fully 15° beyond the vertical. Hence the newer beds actually lie below the older ones.

A few yards inland from the fissure we have described, and parallel with the stratification, there is

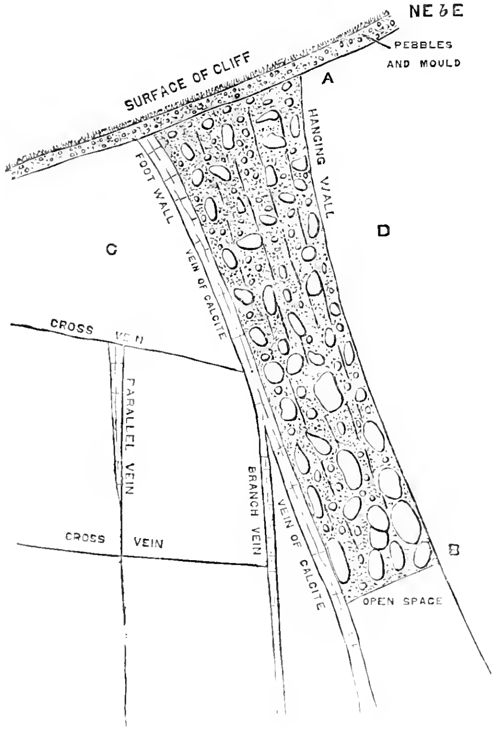


Fig. 65.—Cross-section of Fissure.

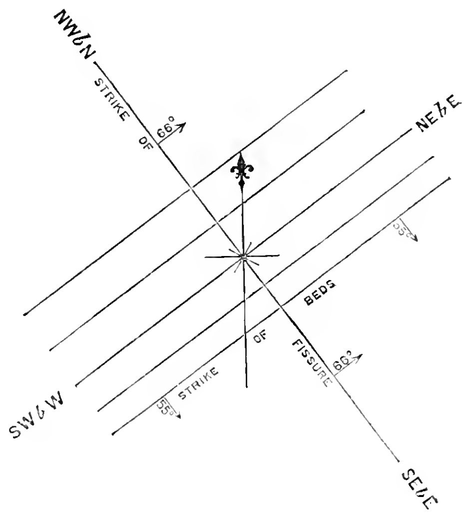


Fig. 66.—Plan.

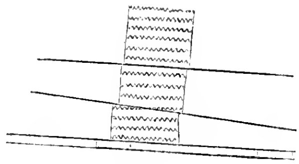


Fig. 67.

Fig. 68.

The fissures and cavities in the limestone are filled up chiefly with pure white calcite, crystallised in rhombohedra, or crystalline and indistinct. The sides of the open cavities are often lined with *scalene dodecahedra*, known familiarly as "dog-tooth spar" (fig. 70), which are transparent, pink, or brown-coloured. Just outside the hanging-wall of the large fissure a number of pink veins occur. Some of these are composed of rhombohedric crystals of calcite made up of alternate white and pink layers. These agate-like crystals are very beautiful, and are worthy of a place in any mineralogical cabinet. In the crystalline veins this pink matter appears to form layers parallel to the sides of the vein. The red earthy matter in

a hollow in the limestone, a part of one side of which shows differently coloured layers of calcite arranged concentrically, and yet the whole is crystalline. This agate-like structure is from 2–3 feet long, and about one foot wide. The opposite side of the hollow is formed of stalactitic and mammillated masses of calcite, all of which show a concentric structure. Below this cavity, and parallel with it, can be seen transparent and almost perfect crystals of dog-tooth spar, lining a stratum of the limestone. Both are the result of comparatively slow action. In the first instance, a large cavity having been formed in the limestone, layer upon layer of calcite has gradually helped to fill it up; and in the second, two strata, having become separated to a certain extent, a solution containing pure carbonate of lime has filled up the fissure or space intervening between the two beds, from which beautiful and well-developed dog-tooth spar has slowly crystallised out.

The small fissures running through the limestone cannot all have been produced simultaneously; on the contrary, they have been formed from time to time, and are being formed still. Carbonate of lime is

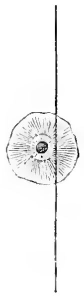


Fig. 69.

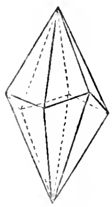


Fig. 70.

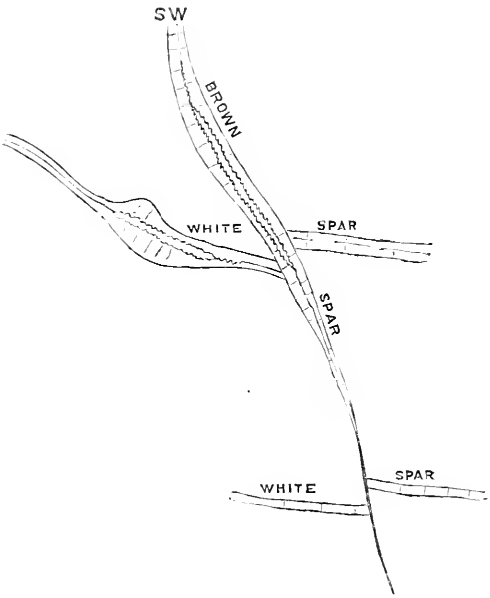


Fig. 71.—Plan.

constantly being dissolved out by water, the solution fills up the cracks in the limestone, and calcite crystallises out. This calcite in its turn may be redissolved, and help to fill up other cracks. This action has gone on ever since the consolidation of the limestone, and it is going on to-day. Nature does not work by fits and starts, but progresses slowly and surely.

E. Halse, A.R.S.M.

ON THE PREMATURE DEVELOPMENT OF BUDS.

UNDER this heading I propose to examine certain phenomena in vegetable morphology, a knowledge of which is essential to the theory and practice of gardening. The term "premature" is apt to convey the idea that the result is abortive; but this is by no means what is here intended, although abortive cases do occur, as will presently appear. What is here intended amounts to this; that from innate vigour, or from external stimulus, buds are, or may be, forced forward so to speak, and that this forcing forward sometimes produces a different result upon the bud to that which would otherwise have taken place. For mere convenience, I propose to employ the word budlet for all buds which still nestle in the axil of the guardian leaf. To begin: let us take the common oak for our study. It is May 1881, and we pick an oak shoot, only just emerged from a bud. In the axil of one leaf is a tiny acorn; the other axils are already occupied by minute shoot budlets for 1882! These however are mutable, as we shall presently see.* Thus we see the acorn is a year in advance of the shoots. Turning to the Turkey oak, we shall find all different. Here an 1881 bud is either an 1882 shoot or an 1882 acorn; in other words it "bears an old wood," and there is no pressing forwards as in the common oak. The Sallow is consequently like the Turkey oak, because it puts forth its catkins before its leaves foliate; and the same occurs with the hazel, while the beech agrees with the common oak. But to return to the shoot budlets for 1882, which we left at peace in their axils. Let us examine a few cases in which these oak budlets are prematurely brought forward—I mean in the more generally accepted sense of the word. First let us take an example from the effect of season on these budlets. If wet weather occur about August, the budlets produce shoots, but these shoots succumb to the first frost, having had no chance of perfecting their auxiliary budlets.

Turning now to galls, which are brought forth by the puncture of insects, such as cynips (a genus of the Hymenoptera, or bee tribes), we find that one species (*Cynips Kollaris*), by puncturing a budlet brings forth, as if by magic, the well-known Devonshire or marble gall in 1881; but had it not been for this puncture the budlet would not have produced a shoot until 1882. *Cynips gemmea* selects a similar budlet, and the result is the imbricated gall known as the artichoke gall. Turning to the oak apple, here the parent cynips punctures a bud, not a budlet, and the spongy gall produced is in no way premature, but simultaneous with the spring shoots of the oak. The bud scales may be sometimes seen at the base of

* "Leaf bud" is a misnomer; no such buds exist.

this gall, forming a calyx as it were, but are more often thrown off. The auxiliary budlets, therefore, which produce acorns, are correctly called subterminal.

All flower buds are either terminal or subterminal. The bud which ordinarily occupies the end of a shoot is merely so placed that the shoot may be eventually elongated, and is not therefore (strictly speaking) "terminal." In the foregoing I have endeavoured to point out what is not premature development, because this appears to be the best way of demonstrating what is premature, thus helping to show that in many cases budlets are prematurely brought forward as I suggest. Many, I know, prefer considering a budlet as having a determined character from the first. But are they prepared to affirm that some budlets are pre-ordained to be galls, irrespectively of insect puncture? Certainly not! If then budlets can be affected by insect puncture, why not by other agents? It must be remembered, however, that the acorn is so well developed when the leaves first unfold, that the budlets must have had a determined character ere the bud bursts. Not so with the gall. Here the budlet must, I think, be acted on after the shoot is produced. The gall then, whether Devonshire or artichoke gall, is in no way an "aborted acorn" as the late Edward Newman contended. When theories of this kind are advanced, it is sometimes difficult to say whether they are the result of a firm conviction, or are merely put forth to excite investigation. In the latter case they are not likely to prove altogether unproductive. Returning to our buds, let us look at any hawthorn hedge, and we shall find that whenever a shoot of 1881 has been cut off, the budlet, or even the two budlets immediately below, will be brought forward as a shoot instead of remaining at rest until the spring of 1882. With regard to the oak, it is almost needless to observe that where an axil of a leaf is occupied by an acorn no budlet is produced for the following year. Thus we see that the effort of reproduction is a supreme effort—it rises up a shoot, so to speak. Exactly the same thing happens in the case of the marble and artichoke galls. In the vine, if my memory does not mislead me, the thyrsus is produced on the young shoot in place of a leaf, but of course no budlet is produced in its axil. The tendril likewise occupies a leaf's place like the thyrsus, and like it produces no auxiliary budlet. This is somewhat anomalous, a great effort with an apparently small result. It may be observed here that tendrils frequently have a tendency to produce grapes. Some of my readers will contend that natural leaves are immutable, and so indeed they are when properly understood; but it must be borne in mind that there may be provisoes or "saving clauses" in a law which are just as much a part of the law as any of the other clauses.

H. W. Kidd.

Godalming.

NATURAL HISTORY JOTTINGS FOR 1881.

In Science-Gossip, for several months past, there have appeared from various correspondents many notices of the great scarcity of wasps last year (1881); but I have not observed any allusion to a scarcity of the humble-bees, which was, so far as my own observation goes, almost as striking. From the first of May up to its close I find noted down in my diary the fact of the usual plenty of the queens of the common humble-bee (*Bombus terrestris*) on the wing, as well as rifling the blossoms of the butterbur (*Petasites vulgaris*), the catkins of the willow, the blossoms of the gooseberry and currant bushes, and the honey-laden pendent racemes of blossoms of the sycamore; as well as less numbers of the moss or carder-bee (*Bombus muscorum*) at the blossoms of the cowslip, butterbur and gooseberry, but never at the willow catkins. Also, the fact that the large queen wasps were plentiful about the middle of May at the blossoms of the gooseberry bushes, as well as having been observed at the willow catkins or palms, as they are called in the north of England. The last note I have of the wasp comes under date May 30th:—Observed a wasp cutting or rasping off with its mandibles fibres from a stake in the hedge: there has already been considerable impression made on this stake by this operation, there being shallow tracks of about $\frac{1}{10}$ or $\frac{1}{12}$ inch in width, but of very inconsiderable depth, the surface layers of fibres being alone cut away, and showing up the excavation of woody fibres by the lighter colour of the wood beneath. The day was very fine, the sunshine being hot and continuous.

On Whit-Monday, after about a fortnight of very fine weather, a thunderstorm of great violence, accompanied by a remarkable fall of large hail as well as a heavy rainfall, occurred in the neighbourhood of Harnham and Bradford, Northumberland, where I was then staying. This was succeeded by some exceptionally cold days and intensely frosty nights, which was, I think, sufficient to account for the subsequent paucity of the humble-bees, and the almost entire, if not absolute, disappearance of the wasps, within my own sphere of observation.

June 6th (Whit-Monday).—Morning fine, cool; forenoon fair, fine, but quite cool, the wind being easterly, until near ten o'clock, when a severe thunderstorm which had arisen in the west and was travelling in a north-westerly direction, returned south and broke with great violence over Harnham Buildings, commencing in lightning and thunder and some heavy drops of rain, shortly to be followed by an excessively heavy and continuous fall of large hail, accompanied with frequent vivid flashes of lightning and loud quick peals of thunder, which bespoke the near proximity of the storm. The quantity of hail that fell was very great—was simply enormous, the ground being soon covered and white with it in the immediate vicinity, as were also the tops of the houses. The hailstorm was immediately succeeded by a heavy and continuous fall of rain, accompanied by a remarkably low temperature, which lasted all the afternoon; the evening and night were fair, but quite cold. At five P.M. the hail, notwithstanding the long-continued heavy downpour of rain, still lay thick in furrows, behind hedges and dykes, and also amongst the grass; while at the back of the buildings which look westward, the hail lay in large wreaths, formed in great part by the large quantity that had slidden down from the tops of the houses, like snow in a thaw.

Such was the violence of the storm of hail that the foliage of the trees and more especially that of the hedgerow and fruit-bushes was lacerated and cut up, leaves and parts of leaves strewing the ground. The young green fruit of the gooseberry and currant bushes was also in part struck off, and to a great extent scarred by the hail, which was of large size, but not, as is very frequently the case in violent thunderstorms in summer, of exceptionally large size and icy consistency. The foliage of the butterbur, a large leaved dock, and the stinging-nettle, was literally riddled as well as scarred, the two former especially, their leaves being large and presenting a goodly surface and resistance to the hailstones which have acted as so many shot; whilst in the garden the large leaves of the rhubarb were also riddled and scarred, as were those of the peony; and those of the rag-jack, potato, bean and pea were greatly lacerated and cut up and scarred, those of the first tree more especially. The foliage of the primroses which form a border to some of the walks, being close to the ground and presenting much resistance, was cut up worse than any in the garden, that of the young radishes perhaps excepted. The extent of country over which this remarkable fall of hail extended (remarkable, inasmuch as such a fall at the time of year was beyond the experience of persons verging on sixty years), was, so far as could be gleaned, but limited. At the village of Belsay, which is between two and three miles to the eastward, no hail fell, though the storm of lightning, thunder and heavy rain was severe enough. Even at Harnham village, which is but a short distance off to the north-east (less than half a mile), a very great deal less hail fell than fell here (Harnham Buildings); while at Saugh House, one mile to the east, and at Edge House, one mile to the west, little or no hail fell. At Bavington, about six miles in a south-westerly direction, no hail fell, and the thunderstorm was at some distance from it; there was, however, a rainfall.

June 7th.—Morning very cold; forenoon dull, very cold, the wind northerly; a goodly wreath of yesterday's hail still lies at the back of the buildings. Afternoon cloudy and quite cool, the wind northerly, at 2.30 P.M. all the hail-wreath had not yet disappeared from the back, and at 3.30 P.M. a sharp shower of damp hail fell; these are fair criteria of the lowness of temperature existing to-day. Evening and night fair, but cloudy, and quite cold. A week to-day the heat was oppressive, it being a genuine summer day, as was also the day previous.

June 8th.—A cold cloudy day and evening, the wind northerly; the night, though fine, was remarkably cold. Since the commencement of the thunderstorm on Monday last (6th inst.), the weather has been positively cold; the temperature fell considerably on Saturday last (4th inst.), and on Sunday, which was otherwise a fine day, the air was quite cool, the wind being then, as on the Saturday, westerly. On Monday morning the wind was easterly and cool.

June 9th.—Morning and forenoon cloudy and very cold, the wind being still northerly; evening and early night finer, calmer, and less cold. Up till to-day, from the 6th inst. inclusive, there have been some very severe frosts at nights.

June 10th.—Fine sunny morning, but cool; had been a very severe frost overnight; forenoon fine, cloudy, calm and much warmer than it has been since Monday's storm; afternoon, evening and night dull and very cool—cold indeed. Since Monday inclusive, the only species of humble-bee that has been observed flying has been the moss or carder bee, which I have frequently seen rifling the blossoms of the bugle (*Ajuga reptans*) and water avens (*Geum rivale*), notwithstanding the winter-like coldness that has prevailed.

From this date the air became warmer, though the weather still continued very changeable.

Now, is it not extremely probable that a storm such as this, accompanied and succeeded by such a low temperature, cloudy weather, and a succession of keenly frosty nights, would kill off the majority of queen wasps and humble-bees that were in full activity, founding new colonies immediately before and, indeed, probably right up to its occurrence? Why the moss or carder bee (*B. muscorum*) should have survived in superior numbers to the others was possibly owing to its greater hardiness, or better protection in its dry grass and moss hive; that it is of a hardy nature was evident from its being on the wing during the prevalence of the spell of winter-like weather described. This bee is at this place called the "Miller" and "Dusty Miller": when a boy, at school a few miles north-east from Newcastle-upon-Tyne, it was the "Sandy Bum'ler" of juveniles; while the common bumble bee (*B. terrestris*) was "The Bum'ler," the orange-tailed humble-bee (*B. lapidaria*) being the "Red-arsed* Bum'ler;" all three names being distinctive enough.

* *Vide* Nuttall's "Dictionary."

Although staying in the district indicated from early in May until the close of the third week in August, I never saw but two nests of the humble-bees, and both these were nests of the moss or carder; though continually on the look-out for anything pertaining to insect life, and having the co-operation of several active and intelligent youngsters keen to tell, show, or bring me things pertaining to Natural History. One evening, on returning from a walk, I was greeted with the information of a "Meggy-mony-feet" of two colours, having been found beneath some loose soil and stones near an outhouse, and which had been preserved for me. Though knowing that a "Meggy-mony (*i.e.* many) feet" meant a centipede of some description, I was rather dubious as to what I should find in the box into which the captive had been put, since a centipede of two distinct colours I was unacquainted with. However, on raising the lid of the receptacle, there truly was a fine centipede (a species of Lithobius, if I err not) of two very distinct colours, being in the anterior two-thirds of its length of a light lead-grey colour, while in its posterior one-third it was of the normal yellow-brown; this strange disposition of colours being due to the fact of this myriapod being in the act of casting its skin or shell, which was being passed backwards along the body, and the new soft integuments beneath having not yet attained their normal hue.

CHARLES ROBSON.

Elswick, Newcastle-upon-Tyne.

WATER-SNAILS; A STUDY OF POND LIFE.

By the Author of "Plant Life."

[*Continued from page* 81.]

WE have seen all we can of its external appearance, now let us take a glance at its interior. We take a specimen of the large pond-snail (*Limnæa stagnalis*), and dip it into *boiling* water. Death is instantaneous, and consequently painless. Now place it in cold water for a few minutes, insert a pin or needle into the animal and so extract it from the shell. Now pin it out on a piece of flat cork or wood, or what is better get a shallow wooden trough, a few inches square and an inch and a half deep, and pin the snail to the bottom. In doing this be sure that the pins pass through the skin, or "mantle," only. Now cover the specimen with water, and with a fine pair of scissors cut through the mantle from the head to the small end. This will necessitate an alteration in the pins, so as to lay open the interior. We have now the principal organs exposed, and, commencing from the head, the most striking is the "buccal-mass," a cluster of muscles enclosing the mouth. By carefully cutting through this mass we may extract the "lingual membrane."

Just below the buccal-mass we notice a number of fine white branching threads given off on each side. These are the "ganglia" of the nervous system, and by carefully clearing away the salivary glands we may trace these ganglia for some distance. One set distributes its branches over the region of the head, and is hence called the *cerebral* ganglia; others transmit sensation from the "foot" (*pedal* ganglia), whilst a third set gives sensitiveness to the mantle and the stomach (*parieto-splanchnic*). These ganglia constitute the whole nervous system of the animal, and their thickest portions form a ring round the œsophagus. This œsophagus is continued backwards to the stomach from which it passes as the intestine, which returns nearly to the head, and has its external aperture beneath the fold of the mantle. The smaller

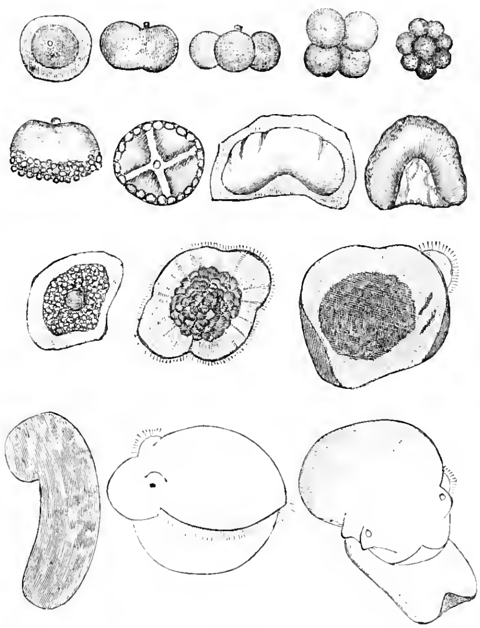


Fig. 72.—Successive stages in the development of *Limnæa pereger*.

end of the animal is seen to consist of a large brown granular mass surrounding the stomach and through which the intestine winds. This mass is the liver. Previous to the intestine entering the substance of the liver it enlarges considerably, the enlarged portion constituting the gizzard. Near it are the salivary glands, long, yellow fatty masses, and the renal organ and mucous gland. The renal organ is analogous to the kidney in higher animals, and the mucous gland supplies the copious discharge of slimy matter by means of which these creatures glide over various surfaces. The intestine, it should be noted, after taking its course through and around the liver, returns towards the snail's head and seeks the surface on the right side just beneath the fold of the "mantle," or outer skin. In the same region is the opening of the air-chamber, the latter formed by a folding of the "mantle." Within this chamber the pulmonary vessels are spread out, and thus the blood is brought into contact with the oxygen of the contained air. The air, of course, soon becomes vitiated by this process, and our snail has to seek the surface of the water and open the air-chamber, which becomes charged immediately with pure air. The blood thus purified returns to the heart, whence arteries discharge it to various parts of the body; but although there is a well-defined auricle and ventricle there is no system of vessels, beyond mere channels and folds of the various portions of the body. Thus the pale bluish-white or colourless blood circulates, without any definite course, about the general body-cavity, and around and within the various organs there contained.

We have briefly mentioned the nervous system; let us see more particularly of what this consists. Our water-snail, in common with all other snails, has no true brain. Its chief centres of nerve force are known as "ganglia," and are six in number. These are known as the cerebral, the pedal, and the parieto-splanchnic, of each of which there is a pair. First, the cerebral ganglia. These will be found one on each side of the gullet, just below the buccal-mass, connected by a cord across the gullet. From each of these two cerebral ganglia, or nerve centres, minor nerves are given off to the organs of the mouth, the tentacles (popularly termed "horns") the eyes, and the buccal-mass. Next we have the pedal ganglia, which each give off nerves to the muscles of the foot, and to the "otoliths," of which latter more anon. The pedal ganglia are each attached to the cerebral ganglia by a long cord or "commissure," and by a similar connection to the parieto-splanchnic ganglia. The latter have a somewhat imposing name, the plain English of which signifies that they are the nerve-centres for the intestines and the posterior portions of the animal. As we have stated they are connected with the pedal ganglia, but there is also direct communication with the cerebral ganglia by another long commissure. They give off nerves to the sides of the body, the shell-muscle, the air-chamber, the heart and great vessels.

(*To be continued.*)

THE CUCKOO.—With respect to a cuckoo taken at Westbourne on the 21st of June, 1880, two circumstances seem worthy of note. Its plumage still (March, 1882) retains much of the colours assigned by Jenyns to the "young of the year." It has several brown feathers on the head, and the wings exhibit scarcely any change from the immature plumage. Another point is that since last Michaelmas it has drunk no water and refuses it when offered. As, unlike parrots, it has had no bread and milk, this is the more observable. Can any one inform me if this is a usual habit of the cuckoo?—*F. H. Arnold.*

OBSERVATIONS ON THE INFLUENCE OF THE SUN'S RAYS ON THE DEVELOPMENT OF THE OVA AND TADPOLES OF THE FROG.

By ALEXANDER M. McALDOWIE, M.D.

SOME years ago, while investigating the colouring matter of animals, the presence of a uniform layer of dark pigment covering the ova of the frog attracted my notice, as it is peculiar to the eggs of

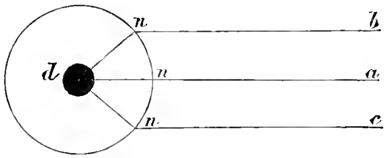


Fig. 73.

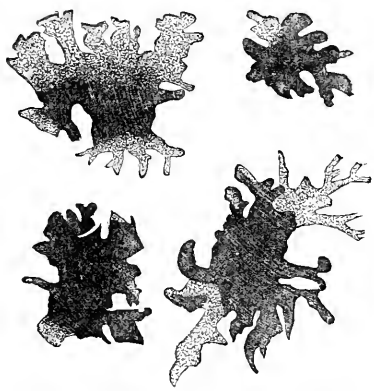


Fig. 74.—Pigment-cells of Tadpole of Newt.

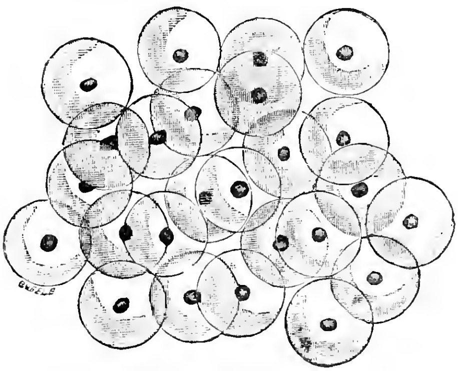


Fig. 75.—Frog-spawn.

the tailless batrachians. It appeared to me to be probable that this layer of pigment must have reference to the action of the sun's rays, and I made the following experiments to discover, if possible, whether the process of hatching is affected by the presence or the absence of light. But first let me describe the structure of the ovum, so far as it differs from that of other animals.

The pigment is deposited in a thick uniform layer in the outer membrane, or ecto-sac. It is dark brown in colour, and covers all the surface, except one small round spot.

Instead of being enclosed in an opaque shell of calcareous or horny matter, which is almost invariably the case with the ova of other animals, those of the frog are surrounded by a fine transparent homogeneous membrane. Between this membrane and the ecto-sac clear gelatinous matter occupies the space where the albumen of the egg is usually found. It is quite different in its chemical composition from the albumen of eggs, being allied to mucin. I have not found any other animal secretion having exactly the same chemical composition. Its great bulk in proportion to the size of the ovum it surrounds is very peculiar. It swells out to many times its original bulk when it is deposited in water. It is usually stated that it is simply for nourishing the embryo during the process of development, but only a fraction of its bulk is consumed when the young tadpoles escape. It is generally supposed that the tadpoles feed on it for some time after they are hatched, but this is by no means invariably the case; for large masses of it are very common along the edges of ponds and ditches after the young have escaped and attached themselves to the stems and leaves of aquatic plants. To satisfy myself that it was not necessary to the young after they were hatched, I removed about fifty of them as soon as they emerged from the mass and placed them in a separate vessel. They developed as rapidly and seemed as strong and healthy as those I left in the vessel with the gelatinous substance. There is no doubt but that this large amount of gelatinous matter is intended to protect the ovum from the extremes of temperature to which it is exposed in the early spring. It can scarcely be called highly nutritious, for I evaporated three ounces of it over a hot-water bath, and obtained only seven grains of solid matter, or only about one-half per cent, the rest consisting of water.

In addition to their transparency, the bulk, consistence, and form of the envelopes, aid in transmitting light in a rather curious, although accidental, manner. Thus the ray of light (*a*, *n*, fig. 73) falling perpendicularly on the surface of the spherical mass, passes straight through to the ovum *d*, without its direction being changed; while the rays *b*, *n*, and *c*, *n*, falling obliquely on the surface, are refracted towards the axis and meet at *d*. The gelatinous mass, in fact, acts as a lens, condensing all the rays of light which strike its surface, so that they fall on the pigmented ovisac, for we know that in a spherical lens the focus is at the distance of the radius of the sphere.

We have, in short, exhibited in the spawn of frogs, mechanical arrangement somewhat similar to that observed in the eye; a dark pigmented layer for receiving the light, like the choroid coat; a spherical lens in front resembling the cornea; and an intermediate, clear refracting medium corresponding to the humours of the eye.

Early in March 1878, I obtained a mass of frog's spawn and divided it into three equal parts, each of which I placed in a separate flat glass vessel. One of these I placed in a window having a south-westerly aspect, so as to be exposed to direct sunlight during the greater part of the day. A second portion was placed in the same window, but enclosed in a small dark chamber, arranged so as to allow thorough ventilation. The third portion was placed in a window looking almost due north in the same room. The development of the two portions in the south-western window took place with equal rapidity, and the young tadpoles escaped from both masses on the same day. The eggs exposed to the light in the northern window were much slower in their development, and were hatched about a week later. The temperature in this window was always several degrees lower than in the other during the day; occasionally the difference was as much as 10° or 15°. A thermometer suspended in the dark chamber, showed that the temperature in it was as high as in the direct sunlight. These experiments—which I have since repeated with the same results—prove that heat is the sole, or at any rate the principal agent for maturing the ovum, and that the withdrawal of the stimulus of light does not check its development. This is in accordance with what is observed in nature; the period of hatching varying from a few days to several weeks, according to the temperature of the atmosphere, clear, sunshiny frosty weather retarding development as much as dull cold weather.

If our experiment stopped at this point, it would seem as if this elaborate arrangement of pigment layers and transparent envelopes had no reference to the action of light. But if we watch the further development of the tadpoles under the same conditions, a remarkable difference between those exposed to the light and those kept in the dark is soon manifest. The former increase in size rapidly, and in due time undergo metamorphosis, while the latter never acquire full growth, are much paler than natural, and their metamorphosis is retarded for an indefinite period. I have kept tadpoles in an ordinary sitting-room for about six months, removed from the window as far as possible, and at the end of that period they were only half grown, and showed no signs of metamorphosis. These experiments then demonstrate that the absence of light does not prevent the hatching of frog's spawn. Like the seed of plants, and the ova of all other animals, a certain amount of heat is all that is necessary.

Light, however, appears to be necessary for the development of healthy young; and its influence is very marked after the tadpoles are hatched. The pigment is then enclosed in stellate cells. Under the microscope, movements may be observed when these cells are stimulated by light; the pigment granules at one time congregating in a spheroidal mass round the nucleus, at other times becoming diffused in a radiating manner through the cells or into the processes.

I began these experiments under the impression that the peculiarities of structure presented by the ova and tadpoles had reference to the heat rays of the sun. A ray of light is a very complex object, and is resolved by a prism into three primary constituents, the luminous rays, the heat rays, and the chemical rays. The luminous rays produce the familiar coloured band termed a spectrum: the chemical rays and the heat rays are invisible. It is the chemical rays which act as stimuli to the healthy development of the ova and tadpoles. Professor Jung, of Geneva, has lately been experimenting on the effects of coloured light on the eggs of frogs and fishes, and has shown that their development is quickened by those colours which are situated at the chemical end of the spectrum. Precisely the same effects have been observed in plants. The chlorophyll, or colouring matter of plants, is analogous to the pigment of animals. Pringheim showed the action of the sun's rays on chlorophyll by experiments similar to those of Jung. That the effects produced were in no way due to the heat of the sun's rays was shown by interposing in the path of the beam various coloured media, when it was found that a blue solution, which shuts off nearly the whole of the heat rays, had no effect in stopping the action of sunlight; while with a red solution, allowing eighty per cent. of the heat rays to pass, the cell and its chlorophyll contents remained quite unaltered. The representation of images on the retina is now known to be photo-chemical. Moreover, Professor Tyndall performed a remarkable experiment to show that the heat rays had no action upon the eye. Excluding the luminous rays by means of a layer of iodine, he brought the heat rays to a focus on the retina, but no impression of light was produced The optic nerve was not even conscious of heat, although a sheet of platinum placed in the same position became red hot.

We have thus both positive and negative proof that it is the chemical rays of the sun which act on the ova and the tadpoles.

Allow me now briefly to recapitulate the principal facts which these experiments demonstrate, viz.:—

That the ova and tadpoles of the frog possess a structure specially adapted for the reception of the sun's rays.

That the stimulus of the sun's rays is necessary to enable them to arrive at maturity, although development will proceed to a certain stage in the dark if moderate warmth be supplied.

That the chemical rays of the sun are the chief stimulating power.

That this chemical stimulus must be necessary from the period when development begins, is shown by the hatching of weakly tadpoles when the light is withdrawn, and by the acceleration of development under blue light. I am inclined to believe that it is also to a great extent for protection that pigment is present in the ecto-sac of the ovum, to prevent the delicate structures beneath from being destroyed by the heat of the sun's rays. The humours of the eye are known to be highly impervious to the invisible calorific rays. The gelatinous matter has doubtless the power of absorbing a large proportion of the rays of light which fall on its surface. All other animals which lay eggs with clear gelatinous envelopes—e.g., newts and snails—deposit them in sheltered places, such as the under-surface of the leaves of aquatic plants, where they cannot be injured by sunlight. But the ova of the frog are deposited in exposed situations by the side of ponds and ditches, and nature makes provision for their protection by covering them with a thick layer of pigment.

Stoke-on-Trent.

OBSERVATIONS ON CROWN ANIMALCULE (*STEPHANOCEROS EICHORNII*).

DURING the month of November of last year, myself and my fellow microscopist, Mr. Dean, whilst searching a pond in this neighbourhood, alighted on a colony of *Stephanoceros Eichornii*; this we thought was remarkable, owing to the lateness of the season, and more so because I had groped this pond all the summer without success. They were grand specimens, exceedingly healthy, and the ovary was full of ova, and afforded a good opportunity of watching and making a few observations on the incubation of the ovum of this beautiful creature. I was unfortunate in not seeing the ovum escape from the ovary, but on December 3rd, I discovered the egg in a receptacle of the cell close to the mouth, as seen in fig. 76, *a*. What struck me as very remarkable about the ovum was the fact that, instead of sinking down the cell and consequently under the creature, as is the case with the eggs of the Floscularïæ, it came to the surface, and was received in a recess of the cell. It was also remarkable that as the parent receded into its cell, either from sound or gulping its food, the ovum is dragged partially down the cell and left in that position, and on the return of the creature is forced upwards into its receptacle. Whether there is an attachment, in the shape of ligatures from the parent to the ova, I am not able to discover, but I am led to infer that there is, because in descending the ovum is dragged down by its posterior end (fig. 76, *b*) and rises again as the creature emerges out of its cell. I am very much inclined to believe the theory of there being a ligature, because as the creature approaches maturity the ovum did not recede with the parent into its cell, but remained in the recess. The suctorial symptoms are the same as occur in the ova of Brachionus previous to the bursting of the covering.

The cilia keep up a continual lashing; the little creature is thoroughly rolled up within itself, tail to its head; the shapes it takes are very various, owing to the constrictions which take place, and nothing can be discerned of those semicircular toothed arms which make the *Stephanoceros Eichornii* such a beautiful

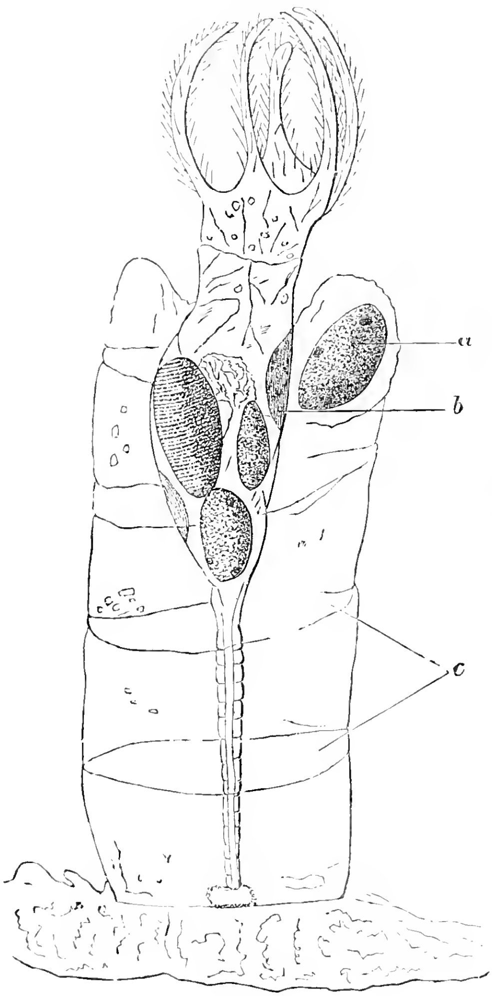


Fig. 76.—*Stephanoceros Eichornii*, mag.

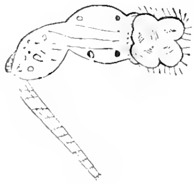


Fig. 77.

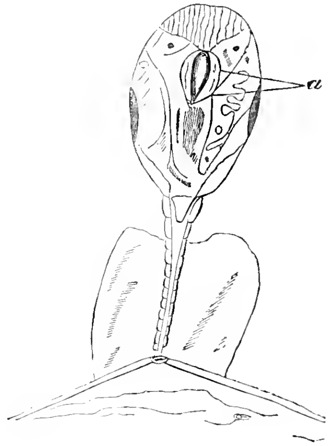


Fig. 78.

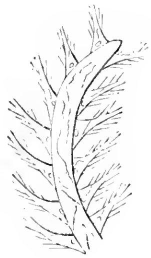


Fig. 79.

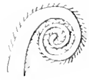


Fig. 80.

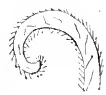


Fig. 81.

creature amongst animalcules. It took nearly fifty-six hours for the egg to hatch. On making its escape from the egg the creature bursts its covering by a sudden jerk of the posterior portion of the body, much resembling the jumping action of the shrimp; the whole surface of the shelly covering seeming, by the aid of the binocular, to be forced upwards, and the little one floats out into its world of water (fig. 77). This was entirely a new aspect to me, for, after rolling and dodging about, and performing some curious gymnastic exercises—as if overwhelmed with joy, and scarcely knowing how to appreciate the seemingly many pleasures that lay before it—it assumed the vermiform shape that one sees figured in Pritchard's "Infusoria," plate 37, fig. 4. This seems to be the larval state, for there is not the remotest sign of tentacles or maxillary apparatus. It gradually swells and undergoes the same convulsive jerks that one sees as it approaches maturity in the ovum. It took up its abode close to the fringe of a leaf, and during the night, that is to say, between one and eight in the morning, the body had taken the form as seen in the adult *Stephanoceros Eichornii*, minus the arms (fig. 78). The ciliary fringe, which is so conspicuous during the first and second stage, had entirely disappeared; the creature lay perfectly quiescent in a very transparent cell which it had formed round itself. It had attached itself by its tail to some Confervæ; and here I would offer a few remarks on the "cell." I am sorry to do so, but I must most decidedly disagree with the remarks made by Pritchard on the cell of the *Stephanoceros Eichornii*, viz., "The cell apparently is not tubular, but a solid gelatinous mass envelopes the animal as high up as the base of the rotary arms." This new cell came up as far as the posterior portion of the body, and I was able to look down it. This was the "first stage" of the cell; it was gradually built up in layers, and this, in my opinion, explains the cause of the ribs of the cell (fig. 76, *c*). It is perfectly hollow, there is no attachment between the cell and the creature, and I have no hesitation in saying that it is quite as independent of its cell as *Melicerta ringens* is of its cell. The dragging down of the upper portion of the cell is caused by the teeth of the tentacles—which are armed with fine spines (fig. 79)—overlapping the sides of the cell and dragging it partially down; and not from the attachment of the cell to the neck of the creature; for if such had been the case, the ovum, on being drawn into the cell, would have performed a rotating motion, from the fact of being rolled up in folds as the cell was being dragged down. Such was not the case! And to make the theory more conclusive—I ought in justice to say, Slack's theory, for he entertained a similar opinion, but I know of no record of his having worked it out—I took a very fine healthy *Stephanoceros Eichornii* from my tank, determined to prove the question at issue, "whether the cell of *Stephanoceros Eichornii* was a solid gelatinous mass or merely tubular." After paring down the leaf to which it was attached, I placed it on the plate of the live-box, with a small quantity of water, under a "two-inch objective, B eye-piece, Swift." I had, in other specimens, carefully observed the longitudinal muscles that extend down the peduncle. I took a very fine lancet and severed the muscles, cutting the tail through close to the base, and I had the great gratification of seeing her swim out of her cell at the oral orifice, leaving the cell perfectly intact; with small portion of tail attached to the piece of leaf. I sent for Mr. Harvey, F.C.S., the public analyst for this district, and member of the E.K.N.H.S., and he too is able to verify the fact of the cell being "tubular" and not a "solid gelatinous mass."

After this digression, we will now return to our young Stephanoceros. The maxillary organs were well formed, as will be seen in fig. 78, *a*, but, although I watched very closely for a long time, I could see nothing approaching to nutriment taken in by the creature. It seemed to me as if nature was resting herself after her labours, and preparing herself for her future efforts of perfection. After the lapse of a little more than two hours, the oral orifice of the little creature began to swell, and small buds began to obtrude and push themselves upwards, much in the same way as one sees the tentacles begin to show themselves on the buds of the hydra. These buds were covered with very minute cilia, and when they had pushed themselves up a short distance they began to gradually unfold themselves in the same manner as one sees the fronds of ferns unfold (figs. 80 and 81), drooping their heads as if bowing their acknowledgments to a divine Creator. They remained in this drooping state for two days; but on the third day they took that beautiful arched form which is indicative of the healthfulness of *Stephanoceros Eichornii*. It was a grand sight to watch the maxillary organs commence their work; gradually they clashed together, the transparency of the creature rendering them plainly visible; and as monad after monad entered the throat, and was received into the crop, the maxilla gradually snapped them up, and ground them for reception into the stomach.

T. B. ROSSETER.

Canterbury.

MY FIRST VISIT TO THE HEART OF THE GRAMPIANS.

THE warmer portion of the year 1881 was on the wane, and my butterflies and moths, benumbed by the autumn air, had ceased to emerge in their breeding cages, when I received an invitation from kind relatives across the Tweed, to spend a season boating among the rocky headlands and ruins that guard about the two Cumbraes. It is needless to say my attention during these aquatic exploits was instinctively drawn to the natural history of a spot already in high repute with the antiquary; and the following is a passing account of what I learnt during my brief sojourn, from the first pages of the great stone book—that too little read heirloom of the past.

The greater Cumbrae, constituting a natural and solid breakwater at the stormy entry of the Clyde, presents the very respectable dimensions of three and a half miles long by two miles broad. Like its smaller satellite, it is fashioned out of a fragment of those red, red sheets of sandstone, that form the edges of the great coal basin of southern Scotland. That tract so rich in providence, the wayfarer learns early to distinguish from the mountainous districts adjoining, by its piles of black shale and the midnight blast of its furnaces. This fragment of sandstone, as the evidence goes, has been upheaved bodily from the depths of the abyss, and in the throe has been covered and broken through with volcanic lavas, chiefly, as has been said, with those of the greenstone variety.

Time was, when this kelpie of the wave was not, when there was as yet no Clyde; and in these days this red stone lay as loose sand on the shore of an inland sea that lashed the feet of the Cheviots and Grampians, and stretched with its fern-clad islands eastward to the north of Ireland. Now the fitful fever of the earthquake and volcano supervening, has broken up and raised the basin of this our great loch Caledonia; yet we may still journey round by way of Stonehaven, Comrie, Rothesay, Brodick, Girvan and Cairn Table, and trace its iron stained shore reposing as of old on the margin of the misty highlands; or we may stop by the way, and with a hammer detach from the more shingly layers commonly called pudding-stone or conglomerate, round white quartz pebbles and glittering fragments of gneiss and slate, that but little comparison will prove to be the water-worn spoil torn from the surrounding mountains.

But has this island verily and indeed been raised in air, and not merely eroded from the mainland as some geologists have fancied? The day is fine, let us coast the fir plantation on the right of the bay of Millport, and wind up by its fungi-haunted shades, where an insensible and circuitous ascent brings the excursionist to a coxcomb-like ridge that forms the highest pinnacle of the island. Here now is a pleasant nook, where, sheltered by this great stone, we may sit and meditate over the fine prospect of the Firth of Clyde, with the homeward bound sails making up at our feet; telling the luxurious hours by the creep of the shadows, and swallow-like flitting of the steamers from bay and headland. But mark, beside our heathery couch lie vast sheets of our old red sandstone, uplifted in air and bent into folds by a force greater than that of a hydraulic press; and here, hard by, see concealed dark congealed flows of lava, the slag of the extinct furnace that raised them. Around us are several tarns or ponds of water, that might possibly mark the sites of extinct craters, or, at least, in my case, I must confess a reverie of this nature arose, on chancing to pick up a rounded mass of sandy ironstone, such as it occurred to me might have been thrown up from one during an irruption.

But we will redescend to the shore line in order to properly acquaint ourselves with the rage and terror of this conflagration. Eastward from the town of Millport, and past the fir-wood, there lies a pleasant stroll along the shore to where a turn at the point brings the ivied castle of Fairlie in view. If my memory deceives me not, nowhere have I seen the wild hyacinth growing thicker in spring or enamelling the woods, as it does over on yonder slope. But stay, right in front of us, behold a grim black dyke (indicated by *a* in our diagram), springing from the sea like a huge iron wall, and running up along the hillside, far as eye can reach; elevated as by Titanic hands above the surface of the still unharvested oatfields. Proceeding a few paces, and passing some children who are picking sour blackberries among the nut bushes, and yet another of these dykes (*b* in diagram) even more grotesque and strange. Here we are confronted by the startling effigy of a gaunt prowling lion, which like the mutilated sandstone cock of Arran and the figures in the Kyles, seems to have emerged from the Noah's ark of wonderland. Story-reading youth is ever credulously prone to associate the lonely caves and ruins of the sea cliff with the unarticulated sighs and moans of the sea and winds; and I know at least one timid inhabitant, who averred she could never pass this rock, half crocodile, half lion, when the moon was at its full, it was indeed then so dreadful.

Freed from all their hazy association with wild dragons and Norse battles, can these dykes, in the eye of the geologist, be less fraught with terror, commanding awe and reverence? Here, indeed, we witness the relics of no glowing lava-stream flowing from vent or crater, but we mark ever yawning rents in the uplifted or faulted ground, up which a pitchy flood has welled from the realms of Pluto. To the removal of the softer sandstone on either side, the wall-like appearance of the lava is due; and this must have been accomplished when the island was dipped deeper in the current, and the action of waves and frosts chiselled out around it a smooth rim (A in diagram), now traversed daily by the sightseer's coach. But also learn the pride of little mortals, the Liliputians of to-day: it was, if you please, the corporation of Millport that made this road. Besides their wall-like form, the even breadth of these twin dykes is not a little curious; for, as meted one day with my umbrella, I found the first throughout its length measured uniformly eight and a half feet, and the second thirteen feet—an anomaly, I concluded, should be attributed to the even pressure of the lava upwards rather than to the force of the earthquake shock.

The little Cumbrae lies a good stiff row from the

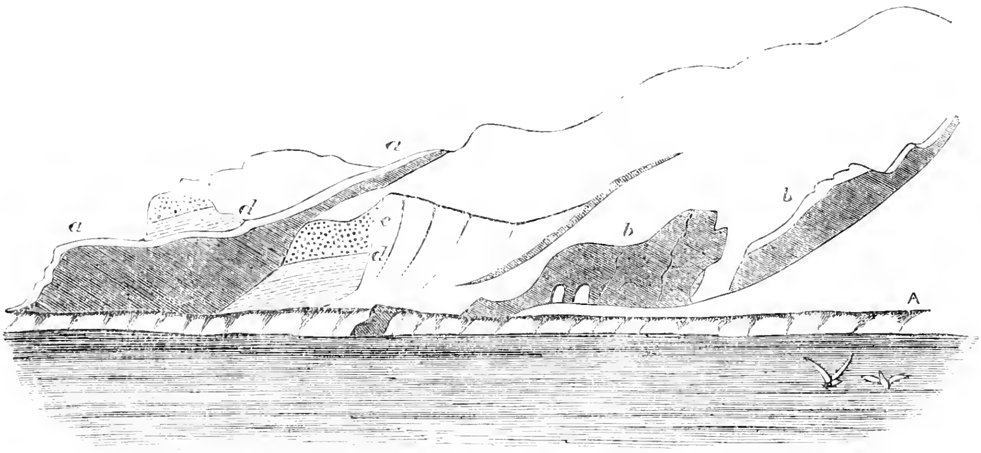


Fig. 82.—Whin Dykes, Greater Cumbrae. *a*, Wall-like dyke. *b*, Lion-dyke. *c*, Old Red Conglomerate, faulted at *a*. *d*, Old Red Sandstone. *A*, Raised shore-line.

larger, with sometimes a little sea breaking. Its history is pretty nearly identical, for it likewise has been raised by a violent volcanic outbreak, that on the west has erected some imposing columnar rocks; later on, it has had a rim with receding caverns incised round it by the wash of the waves, and again it has been further raised so as to expose this planed ledge. Human occupation at a subsequent period is indicated by some Celtic barrows, the ruins of an ancient shrine, and a square embattled castle placed on a reef of rocks at the water's side. Crowning the highest point stands a disused lighthouse, from which a broken stone, engraved D. P. 791, was once poked out. But this, as I learnt, local archæologists consider a counterpart to the famous "Bil Stumps, his mark." It, however, has puzzled them not a little, as the lighthouse was erected before 1791. Numerous trees, plants, and insects populate the crags; but what struck me as most singular was the presence of a green grasshopper (*Stenobothrus viridulus*) incapable of flight, whose advent on this exposed island must have had in it somewhat the zest of an adventure. Did its remote ancestor arrive in a Celtic coracle, or on a log at the close of the glacial days? Interesting in relation to the migration of sea-shells, I might mention a chronological curiosity I obtained during my excursions; namely, a specimen of the common honey-coloured *Littorina littoralis*, which an acquaintance picked from the cement when scrambling over the old castle; this shell, coeval with the ruin, apparently did not exist here during the days of ice.

A. H. SWINTON.

NOTES ON NEW BOOKS.

LIFE, *Letters, and Journals of Sir Charles Lyell, Bart.* 2 vols. (London: John Murray). No better or pleasanter means of becoming familiar with the history and progress of geological discovery could be adopted, by those of our readers who are interested in this subject, than to procure these volumes. The biography of Sir Charles Lyell is indissolubly bound up with the history of the science he did so much to develope. The above work is edited by Sir Charles's sister-in-law, and is composed of many pleasantly-written letters, collected from friends and relations, most of them written by Sir Charles under the stimulancy of fresh scenery, or visits to famous geological sections, or to celebrated geologists. These letters are just sufficiently pieced together by an autobiographical or biographical connection to make the life complete. We have been charmed with every page; there is not a dreary paragraph in the book; and every one will feel the better for the inner acquaintance it gives us of an earnest, pure-minded, tender-hearted, scientific enthusiast.

Nordenskiöld's Voyage round Asia and Europe, by A. Hovgaard (London: Sampson Low & Co.). This is a popular and very pleasant translation from the Danish of Nordenskiöld's famous north-east passage, written by one of the lieutenants of the expedition. It is impossible that a more detailed and interesting account of that voyage could have been penned, for, although we do not get much dry science in this work, such as we naturally expect from Nordenskiöld's own book, there is sufficient to flavour the narrative very pleasantly. The history of former attempted north-east passages is clearly and succinctly written; the sketches of the peoples among whom our adventurers wintered, are most amusing and instructive; the various little adventures, none of them fortunately of a serious character, are related with much gusto. As a history of the north-east passage this book is completer perhaps, for general readers, than a more accurately technical, scientific account would have been. It is a book not likely to be left half read.

Freaks and Marvels of Plant Life, by Dr. M. C. Cooke, M.A. (London: S. P. C. K.). This is an attractive volume in every respect, written by a man whose name will at once command the attention of all readers of SCIENCE-GOSSIP. Moreover, the writer is on his own ground, and he is engaged in a work he loves, viz., trying to interest others in the wonders of that vegetable kingdom he has spent a successful life in exploring. The title page hardly bears out the fullness and thoroughness of the lucid investigations to which this charming book is devoted. All the recent philosophical views respecting botany, and hosts of new discoveries of every kind relating to that science, are here plainly set forth. The illustrations are numerous, and generally good, and the Society for Promoting Christian Knowledge are to be congratulated on the improved, deeper, and broader tone of the few scientific books they are bringing out.

Miscellanies of Animal Life, by Elizabeth Spooner (London: S.P.C.K.). This is a book of another kind; a sort of natural history sausage, full of zoological scraps (illustrated), all of them interesting, but making up a pretty little book which can hardly be called scientific. Still, as a cheap gift-book, it is a great improvement on the meaningless old "goody-goody."

Geology of the Counties of England and Wales, by W. J. Harrison, F.G.S. (London: Kelly & Co.). We sincerely compliment Mr. Harrison on producing a good and much required work of geology, which will save a student, not only much personal research and time, but put him on the track of almost everything geological which England and Wales can offer to him. Not only have we here a clear outline of the geology of every English and Welsh county, illustrated by sections, characteristic fossils, &c., but a list of the papers and other works published thereon, as well as a reference to the museums where the chief collections of each county may be seen and studied. Mr. Harrison has boiled down something like *four thousand* papers, in order to acquire all this useful information, and he has arranged all he has to say clearly and well. This ought to be, and deserves to be, a very successful book.

Practical Microscopy, by Geo. E. Davis, F.R.M.S., &c. (London: David Bogue). Of the numerous works on this increasingly important subject, we do not think any approach the present volume, either in their method of treatment, or skill in arranging the very knowledge which a tyro to the microscope requires. Chapters are devoted to mechanical descriptions (abundantly illustrated) of all the structures, parts, and accessories of the leading types of microscopes, to the collection of objects, microscopical dissecting, section cutting, microscopical measurements and delineations, staining, injection, preparation and mounting, reagents, recipes, &c. The author's style is very terse, but lucid in the highest degree. This work must be, for a long time to come, one of the very first that an earnest microscopical worker will purchase and keep by him for constant reference and advice.

Vignettes from Nature, by Grant Allen (London: Chatto & Windus). A series of papers originally contributed to the *Pall Mall Gazette*, bright, sparkling, and suggestive. Mr. Grant Allen is, *facile princeps*, the popular expositor of evolution; and he nowhere appears to better advantage than in these eminently readable and entertaining essays. Even naturalists of advanced experience will profit by his original comments and generalisations, although some may think he pushes evolution too far, and others that he takes things for granted which have yet to be proved; as, for instance, the existence of *pre*-glacial man. Mr. Allen speaks about that hypothetical person as though no geologist or anthropologist doubted him—instead of which there are few things more doubted. Nor do we think the author has clearly caught Dr. Croll's theory of the alternate changes of climate in the northern and southern hemispheres. These, however, are no drawbacks to the thorough enjoyment of a very pleasant and original book.

The Honey Ants and the Occident Ants of the American Plains, by Henry C. McCook, D.D. (Philadelphia: Lippincott & Co.). The Rev. Dr. McCook has here given the world another of his entertaining volumes on his own original investigations of certain American ants. We have already had to refer to the author's book on the wonderfully-endowed agricultural ants; but those treated on in the present volume seem more appreciated still. The honey ants are natives of Colorado, and Dr. McCook has given them this name, because among these insects there is a differentiated caste he calls "honey-bearers." These are distinguished by their rotund bodies, which are distended with grape-sugar collected by the worker-ants. The latter treated the "honey-bearers" as so many sugar-casks, filling them up at night, and drawing upon them for sustenance during the day. The occident ants are mound builders, and make "clearings" by cutting away the grass and other vegetation, after the manner of the agricultural ants of Texas. The present work is illustrated by lithographic plates of the various species of insects described, their castes, and detailed structures.

Leaves from a Naturalist's Note Book, by Dr. Andrew Wilson (London: Chatto & Windus). We have here another series of collected papers and essays, chiefly on natural history subjects. The author is a well-known and industrious writer on them, and that the reading public can trust him, is shown by the diligence with which they purchase his works. His style is easy and language clear, and he has the power of marshalling his facts so as to make them all tell. This is an elegantly got-up little book, just big enough to put into one's pocket for an occasional read—an intention which the short papers easily enable us to carry out.

The Sun, by C. A. Young, Ph.D.; and *Myth and Science*, by Tito Vignoli (London: Kegan Paul, Trench & Co.). These are two recently-issued volumes of the celebrated "International Scientific Series," than which few books are more welcome. The author of the former is Dr. Young, Professor of Astronomy in the College of New Jersey. For general astronomical readers we could not recommend a better book. It sets forth, in a clear and yet terse manner, all that is at present known and believed about the sun. The enormous addition to our knowledge of the physical condition of our luminary which has accumulated since the application of spectroscopic observation to it twenty years ago, and the closer observation of its spots and other changes made by such men as Secchi, Lockyer, Draper, Proctor, and others, are all found within the present volume; so that it is a popular handbook of solar physics. *Myth and Science* is one of the most original in the whole series, and we are surprised that greater notice has not been taken by psychologists of the author's theory. He holds that we must go deep down into animal natures for the roots both of religion and science; that the terror exhibited by a horse when he "shies" is produced by a feeling that the object dreaded, although inanimate, is alive; that the latter feeling is the same as in the savage produces religion, myth being a later formulation of the feeling. "Myth" has hitherto been regarded as a fanciful product of the human mind, due to extrinsic impulses, whereas the author makes it out to be an intrinsic necessity of animal intelligence. He also holds that the elements of science are identical with those through which mythical representations and the inward life of the human intelligence are developed. A more thoughtful book than the present we could not desire. We have perused it with the greatest pleasure.

Easy Star Lessons, by R. A. Proctor (London: Chatto & Windus). There can be no doubt that the new and extended interest taken in astronomical investigation, discovery, and theory, are greatly due to Mr. Proctor's popularly written works. They have found their way into most libraries, and have won new students for astronomy. Such a book as this before us, for instance, cannot fail to make a man a stellar observer, and, for however brief a period, all the better a man for it. It is divided into a series of chapters (besides the introduction), devoted to each of the twelve months of the year. Four star-maps illustrate the position on every side of the stars in each month, so that identification, not only of constellations, but of the chief stars in them, is very easy. No better book on the subject could be put into the hands of those who love astronomical science.

Magnetism and Electricity, by Richard Wormell, D.Sc. (London : Thos. Murby). The great influence which electrical engineering is likely to hold over us in the future renders it all the more necessary that elementary text-books like the present should be widely known. And, as even in our newspaper literature, in descriptions of the progress made by applied electricity, we are constantly coming into contact with terms and phrases it is assumed that everybody understands (but which in reality are very little understood), Dr. Wormell's book is all the more welcome for helping us out of our difficulty. Suffice it to say that we here find a clearly-explained outline of the newest facts, discovered laws, applications, and theories relating to electricity. It is the best elementary text-book before the public.

The Student's Handbook of Chemistry, by H. Leicester Greville, F.C.S. (Edinburgh : E. & S. Livingstone). This book still recognises the distinction between Inorganic and Organic chemistry, and perhaps for classificatory purposes such a division is useful. Works on chemistry have poured forth from the press in great abundance lately, showing how ardently and generally the study of this important science must be spreading. But we have seen none which appear so promising as the one before us. Its arrangement is very clear and methodical, and the author has the rare power of putting the newest views in chemical philosophy before his readers in such a manner that they are at once apprehended. This treatise is fuller and ampler than the slim abbreviated manuals it is the fashion to bring out. We can condense chemistry less than any other, and yet, somehow or other, "Elementary Chemistry" books are much briefer.

Acoustics, Light and Heat, by William Leeds, M.A. (London & Glasgow : W. Collins, Sons, & Co.). A short, well-arranged little treatise on the above growing subject, arranged in strict accordance with the syllabus of the Department of Science and Art.

The Scientific Basis of National Progress, by G. Gore, LL.D. (London : Williams & Norgate). The author herein sets forth the fact that our future success as a nation depends largely upon our scientific progress ; he shows the necessity for new scientific knowledge, and the obstacles in the way of the latter. Hence he pleads the importance of promoting original scientific research. Present knowledge, Dr. Gore argues, only enables us to maintain our present state, whereas national progress is the result of new ideas, and the chief source of the latter is original research. It is a most thoughtful and suggestive essay.

Consumption : a Re-investigation of its Causes, by C. W. De Lacy Evans (London : Baillière, Tindall, & Cox). This is a small but compendious work, in which the author endeavours to show that the above fatal complaint arises chiefly from an excessive action of atmospheric oxygen.

Trance and Muscle Reading, by G. M. Beard (New York). A short pamphlet, dealing with the subject which Mr. Cumberland has recently astonished the Spiritualists with.

MICROSCOPY.

Cutting Coal-sections.—I have seen it stated that coal can be cut by being softened in carbonate of potash, but like Mr. Kitton I have never succeeded in doing it, and have never heard of anyone who has. Coal soaked in benzine for some time will not be so brittle, but I have never succeeded in cutting it ; I might say do not waste time over it, it is useless.—*Albert Smith.*

Cutting sections of Coal.—I am rather surprised so experienced a microscopist as Mr. Kitton should have put the soaking in potash process to actual trial. I have denounced it over and over again ; at least once, I think, in Science-Gossip. A friend of mine said he believed if Adam had put a piece in to soak it would by this time have been as hard as a cabinet minister's conscience. I should like to challenge the production, not only by this means, but by any means whatever of a real transparent section of coal. At present having failed altogether to obtain a sight of one, I do not believe in its existence. All I have seen have been sections of coal shale or coal nodules, but not one of genuine ordinary coal can I get any one to produce.—*E. Holmes.*

Cutting Sections of Coal.—I can fully endorse all Mr. Kitton says as to the failure of carbonate of potash to render coal easy to cut into slices, as my own experience in this matter has been exactly similar to his. I have also tried a strong solution of caustic potash, with equal want of success. It is not difficult, however, to rub down pieces of coal to a moderate degree of thinness, say $\frac{1}{10}$ inch, but then comes the difficulty (as I have always found it) of rendering these transparent. I have treated them (still following the Micrographic Dictionary) with strong nitric acid, and have also boiled them with the same acid and chlorate of potash, but all to no purpose. The coal gradually dissolved, but remained opaque as before. Will any one who has been more successful kindly give his method?—*W. Dalton Smith.*

SNOW CRYSTALS.—I should be much obliged if you would tell me in SCIENCE-GOSSIP what is the best way to examine snow crystals with the microscope, as they melt even in a room where there is no fire.—*T. Pearson.*

WHAT IS THE MEANING OF $\times$?—T. R. J. is confusing himself needlessly. The meaning of $\times 50$ is that the object is magnified fifty diameters, and has nothing to do with detail at all. If the proboscis of a fly, for instance, is viewed with a 1 in. which will not even show the rings, and then with another which exhibits every possible detail, they may both be exactly $\times 50$. If a drawing of a man 5 feet high be made 20 feet, he is $\times 4$, whether the grain of his skin becomes visible or not, or even if his features should be unrecognisable.—*E. Holmes.*

"THE JOURNAL OF THE POSTAL MICROSCOPICAL SOCIETY."—This Society, which may be said to have been formed by the readers of SCIENCE-GOSSIP in 1873, has now attained to such an influential position as to publish a quarterly journal, named as above. We gladly welcome this additional evidence of intellectual vigour. Among the papers of No. 1 of the "Journal" are the following: "The History of the Postal Microscopical Society," "Numerical Aperture," "Microscopical examination of Chlorophyll, Inuline, and Protein Crystals," "Tubifex rivulorum" "Diatoms," "How to prepare Foraminifera," "Lichens," "An hour at the Microscope" (by Mr. Tuffen West), reviews, notes, reports of societies, correspondence, &c. There is a sound and healthy and enduring look about this "Journal" that all will like. The illustrations are capital.

"JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY."—The bi-monthly issue of this now attractive Journal contains the address of the President (Professor P. M. Duncan, F.R.S.); papers on "Mounting Objects in Phosphorus, and in a solution of Biniodide of Mercury and Iodide of Potassium," by J. W. Stephenson (vice-president); "On the Threads of Spiders'-webs," by John Anthony, M.D., and a very copious and clear summary of current researches relating to Zoology, and Botany (principally Invertebrata and Cryptogamia), Microscopy, &c., including original communications from Fellows of the Society and others.

WOODS NEAR ENFIELD.—Can any of your readers tell me whether there are any good woods (public) near Enfield, or Barnet, for entomological pursuits; also, are there any local insects in the district?—*M. N. J. F. C.*

ZOOLOGY.

YORK FIELD NATURALISTS' SOCIETY.—A very interesting exhibition by members of the St. Thomas' Field Naturalists' Society, of York, has been held with much success, and the Dean of York gave an admirable address on natural history, in which he alluded to the influence left behind it by the recent meeting of the British Association. The above exhibition consisted largely of specimens collected by the members during the previous summer.

FOLKESTONE NATURAL HISTORY SOCIETY.—At the annual meeting of this society, recently held, Dr. Fitzgerald (President) gave a capital address "On the Recent Progress of Science," in which he dealt chiefly with electrical discoveries and the problem relating to fog and smoke. The meeting memorialised the Corporation to secure a site for a Museum, Reading Room, and School of Science and Art.

THE SALMON DISEASE.—In a paper recently read before the Royal Society Prof. Huxley suggests that the salmon disease fungus is the same as that which attacks flies, and that flies thus affected may convey the fungus to fresh-water and so to the salmon frequenting it, when they happen to fall in. He produced the fly-fungus by rubbing a house-fly with a piece of the skin of salmon affected with the disease.

PROFESSOR RAY LANKESTER, F.R.S.—It is with much pleasure we announce the appointment of this distinguished biologist to the chair of Natural History at Edinburgh, vacant by the death of Professor Wyville Thomson. Mr. Lankester's appointment will be welcomed by all lovers of original research, and there can be no question it will greatly stimulate biological inquiry in Scotland.

PREPARATIONS FOR THE DESTRUCTION AND PREVENTION OF MITES IN ENTOMOLOGICAL COLLECTIONS.—I should be glad to know whether any of the entomological readers of SCIENCE-GOSSIP use any other preparations than the following for the above purpose:—Camphor, Naphthaline, Bisulphide of Carbon, Benzole, and Mercuric Bisulphide (Corrosive Sublimate). I should also be glad to hear from any entomologist who has used the oils of Cajuput, Anise, Thyme, Marjoram, Amber, or Turpentine, or any of them (mentioned by Dr. Knaggs at page 120 of the new edition of the "Lepidopterist's Guide"). As I am collecting information upon the subject, I should be glad of answers through the post.—*W. J. V. Vandenbergh, Hornsey, N.*

EARLY SPRING BEES.—The second week in March last was so warm and summer-like that many spring insects were on the wing in this neighbourhood several weeks before their usual time. The most noticeable among these were the bees. By the 18th of that month I had noted no less than seventeen species, many of which I captured in order to remove all doubt about their identity. *Bombus virginalis* and *lucorum*, *Anthophora acervorum*, and of course *Apis mellifica* were out in abundance during the last week in February. *Andrena Gwynana* appeared on March 3rd, *A. thoracica* on the 13th, and *A. nigro-ænea* and *parvula* on the 17th. *Bombus muscorum* and *lapidarius* came out on the 16th. Some of the small *Halicti* were remarkably early. I took *Halictus leucozonius* on March 13th, *H. æratus* on the following day; *H. nitidiusculus* and *morio* on the 16th, *H. cylindricus* on the 17th, and *H. villosulus* on the 18th; on which date I had brought to me the fine var. *tisiphone* of *Melecta armata*. During the entire month I saw but two wasps (*Vespa vulgaris*) and not a single individual of the fossorial Hymenoptera.—*E. D. Marquand, Penzance.*

Markings on Euglena.—Allow me to ask in Science-Gossip if it is usual to find *Euglena deses* marked all over with dots like a diatom. Some I have recently had in considerable numbers, when examined with a one-sixteenth were marked just like *P. angulatum,* excepting that the dots were much smaller and closer, but they exhibited the same hyaline hue that the diatom elevations show with sufficient power.—*E. Holmes.*

Arcella.—I wish to ask the same question about the round brown shell of *Arcella*. This I see covered with black dots all over. I scarcely think these markings can have escaped notice, but I am not able to find any reference to them in Hogg or Gosse or a number of other books. The drawings of Euglena published by Mr. Bolton are of another species; they do not indicate anything of this kind of marking, but of course they may not be present in *viridis*, which species I have not at present to examine. I think the filament at the head of Euglena is certainly not an instrument of progression. *Euglena deses* is a very sluggish creature, yet its flagellum is in constant motion, curling in all directions and apparently feeling about for something. I have noticed the same thing with *Euglena triquetra*, but on this species I fail to see any diatom-like marks.—*Edwin Holmes.*

Squirrels in Ireland.—Mr. Dewar (vide p. 62) may like to know that the squirrel is found in Ireland. They are plentiful in certain woods between Dundalk and Newry, in the counties Louth and Armagh, where I have frequently seen them. While I lived at Bessbrode I often saw young squirrels that had been caught by the boys in Killeary wood,—now alas! cut down. And last year I was told and saw that squirrels abounded in co. Tyrone near Cookstown. In Thompson's "Natural History of Ireland," vol. v. p. 14, is a quotation from Maria Edgeworth regarding squirrels in this county: she wrote, "They not only are to be found, but abound in many places in Ireland, too numerous here to mention."—*H. W. Lett, M.A., Ardmore Glebe, Lurgan.*

BOTANY.

Mushrooms.—I have just picked (March 13) a nice little dish of mushrooms (*Agaricus campestris*) from an old worn-out hotbed. This bed supplied us with a quantity during last summer and autumn, and the few foggy nights in this "County of the Mist" has now brought them forward at a very unusual season. We would advise any friends making hotbeds in the garden to purchase a few bricks of mushroom spawn from the seedsman; these, broken into little bits and inserted around the edges of the manure, will be almost certain to yield a supply of fungi in the summer and autumn.—*James Buckman, Bradford Abbas.*

"Flowers: their Origin, Shapes, Perfumes, and Colours." By J.E. Taylor; London, D. Bogue. We beg to announce the third edition of this book as now ready in time for the opening summer, and to express our gratitude that the reading public have taken the work under their patronage.

An Ancient Herbarium.—Garlands of dried flowers have been found on the breasts of mummies at Deir el Bahari, which must be three thousand five hundred years old. The flowers were so well preserved that the colours of the petals and the green of the leaves were almost perfect, and every species could be easily identified. Chief among them were the Egyptian willow, acacias, the blue water-lily of the Nile, larkspurs, water-melons, palm-leaves, &c. Dr. Schweinfurth preserved the leaves and flowers by moistening them in alcohol, and he afterwards dried them in his herbarium. Two of the garlands were found on the breast of King Aames I.

Conferva.—In Mackay's "Flora Hibernica," part ii., p. 224, the name Conferva is derived "from conferruminare, to consolidate;" while Webster's Dictionary says it is "from confervere, to boil, heal, or grow together, so called from its healing power." I have always understood the latter to be the correct definition, excepting its supposed healing qualities. Does any authority mention them? The appearance of a "green mantled pool" in summer, when the gas is being evolved, is not a bad likeness to something boiling.—*H. W. Lett, M.A., Ardmore Glebe, Lurgan.*

The Bohemian Waxwing.—A splendid specimen of *Ampelis garrula* has just been placed in my hands for preservation. The bird was killed, with the aid of a catapult, by a little boy, at Rednall near Bromsgrove Lickey, on January 30; together with its mate it had made its appearance, a few days previously, in a hawthorn tree (upon the berries of which they fed) in front of the house, and close to the main road. *Frederick Coburn, Exeter-row, Birmingham.*

GEOLOGY.

TABLE OF ROCKS.—We have received the third edition of a table of superposition of British rocks, showing the systems, formations, groups of strata, characteristic rocks, prevalent minerals, and typical fossils, by Mr. Thos. A. Readwin, F.G.S., &c. The table is published, at one shilling, by Messrs. Spon.

THE GEOLOGY OF MADEIRA.—At a recent meeting of the Geological Society, a paper on this subject was read by J. S. Gardner, Esq., F.G.S. Madeira consists almost wholly of sheets of basaltic lava of variable thickness, interstratified with tuff scoria and red bole, cut by innumerable dykes. In the central part of the island is a horseshoe-shaped valley, more than 4 miles in diameter, its bed 2500 feet above the sea, its precipitous walls full 3000 feet high, rising here and there to yet greater elevations, and forming a central point in the mountain system of the island. This the author regards as the basal wreck of a volcanic mountain, blown into the air by an explosion of exceptional violence. Fragments of the slopes of scoriæ which once composed the inner shell remain on the peaks surrounding this amphitheatre. The dykes here are trachyte. The author describes a limestone exposed in one place beneath the basalts, and referred to the Upper Miocene, and a plant-bearing bed associated with them, containing fossils of species still living in the island, some of which have been wrongly referred to extinct forms. In conclusion the author remarked upon the almost infinite variability of the genus *Rubus*, and the difficulty of distinguishing its species.

FOSSIL TREES.—In SCIENCE-GOSSIP for March, there were some notes on fossil trees which had been found in some parts of America, and on reading them I thought the following particulars might be of some interest to your readers. During the last month we have uncovered three large fossil trees in our marl works, and I have taken the following measurements. *a*. 6 feet high, 2 feet diameter at top and 3 feet 6 inches at bottom. *b*. Short stump 2 feet high, 2 feet 7 inches diameter. *c*. 18 feet long, and about 2 feet to 2 feet 6 diameter. I enclose you a photo of the one *a*, to which I will refer shortly. These are not the only specimens we have unearthed, for since the year 1869 we have been continually bringing them to light after their long burial. In the above year, J. E. Davis, Esq., read a paper before the North Staffordshire Naturalists' Field Club in which he described the one then uncovered as a "Calamite," but since then Mr. J. Ward, F.G.S., has read two papers before the same club in which he says, "The fluting on the stems of the trees were characters not usually found on the stems of Calamites, but that such markings were characteristic of Sigillaroid trees." Altogether we must have found some dozens, and below I give you the measurements of thirteen (in addition to the three given above) which were taken by Mr. Ward. These trees occur in one bed or stratum of marl, and in that particular bed the marl is marked very much with the imprints of ferns, and different vegetation, it also contains many fossils of parts of Calamites, and altogether gives a good idea of how prolific the coal-period must have been in vegetation. The insides of the trees have certainly been hollow, although in most cases they are completely petrified, but the stone of which they are composed contains very numerous traces and marks of vegetation and ferns, as if they had fallen in and become petrified with the mud, &c., which filled up the hollow of the plant. On one occasion my brother found the fossil form of some kind of fruit or nut in the centre of one of the trees, but unfortunately it has been lost. In the centre of the tree marked *a* there was a distinct branch of some kind, about 3 feet long by 2 or 3 in diameter, and which ran diagonally down the stem of the tree, the bark of which was carbonised, but which showed longitudinal and other markings very distinctly. These trees from their position are evidently *in situ*, as they stand at an inclination of about 15 degrees from the perpendicular, which corresponds with the "dip" of the strata in which they stand.

No.	Height.	Diameter.	
	Feet.	Ft.	in.
1	6	2	0
2	4	3	0
3	5	4	0
4	1	2	8
5	1	2	8
6	8	2	0
7	4	3	10
8	4	3	0
9	Not measured.		
10	8	2	6
11	2	1	0
12	4	3	0
13	8	7	3 in circumference.

Hanley, Staff. W. HAMPTON, F.C.S.

THE CRAG SHELLS OF ABERDEENSHIRE AND THE GRAVEL BEDS CONTAINING THEM.—Another paper on the above subject, of a very important character, was also read at the same meeting, by Mr. Thomas F. Jamieson, F.G.S. The author, in 1860, described beds of sand and gravel on the coast of Aberdeenshire, containing numerous fragments of Crag shells. His subsequent studies have enabled him to throw much further light on these shells and their mode of occurrence. The deposits containing the shells are almost wholly confined to the districts of Slains and Cruden, and extend up to heights of 225 feet above the present sea-level. They generally consist of coarse gravel with large subangular stones up to $2\frac{1}{2}$ feet in length, intermixed with sand and muddy materials; the whole form ridges, like eskers or moraines, though glacially striated blocks are rare in them. The author describes the coast-section in detail, and shows that the shell-bearing gravels rest on materials that appear to be formed by glacial action and are covered by the Red Clay, which he regards as having been formed during the period of great submergence. The few entire shells are filled with a calcareous matrix, and fragments of the same material are found scattered in the gravel and sand. This lends support to the conclusion adopted by the author, that the sand and gravel have been accumulated by a glacier moving over pre-existent Crag deposits. Among the shells found, 21 could be specifically determined, and of these 67 per cent. occur in the Coralline Crag, 95 per cent. in the Red Crag, and 57 per cent. are living species. Only one species, *Tellina balthica*, occurring in the Aberdeenshire deposits, is not found in the English Crags.

NOTES AND QUERIES.

SATURNIA CARPINI.—I have two specimens of this moth out of chrysalis, one on February 27th, the other on March 1st. Is not this unusually early? They were bred from caterpillars collected by myself in August last in Perthshire, N.B., where they were by no means uncommon. I presume that the cause of their early emergence is the unusual mildness of the weather, and that they have been kept in a well-warmed room.—*C. S. G.*

EARTH WORMS, &c.—My garden, consisting of a fair-sized lawn and several flower beds, is completely overrun with worms and slugs. After heavy rain in the summer the ground is completely covered with worms of all sizes stretching from their holes in all directions, and the roots and leaves of such plants as violets and primroses more especially, also bulbs of all sorts are totally destroyed, while the effect of these creatures darting back into their holes is of a very creepy nature. If any of your readers could help me in remedying this nuisance I should be greatly obliged. I may say that I have, frequently found on taking up violets and crocuses that the root was riddled and a worm curled up and twisted round it. *W. H. Brachett.*

CADDIS WORMS' CASES.—On resuming my natural history rambles, I find caddis worms once more in season. Can any readers tell me how it is that the bits of weeds, grass, &c. they use, keep in their natural state, so long as the insects need them? I observe the same with the rest of nature.—*John Alexander Ollard, Enfield.*

SLOWWORMS AND SNAKE.—I obtained two slowworms from the New Forest, they had none of the ordinary markings, one was pinkish-brown, the other grey. But the most remarkable thing, as I thought, was that on each side of the neck were, in the grey, three, in the other five, rosette-shaped blue spots. In about a month, though the reptiles' bodies did not grow, the spots on each side increased respectively to five and eight. I afterwards found in Kent a crushed, grey, blue spotted one. Is this a common variety? Can any correspondent give me information about the North-American seven-banded snake (*Tropidonotus leberis*) beyond its markings, its size, the fact that it feeds on frogs and is of a savage disposition, and though not poisonous, can inflict a tolerably painful wound? Having one alive, I should like to know its habits; what part of North America it inhabits; whether it is common, and whether it prefers marshy, hilly, or heathy country. Any information will oblige.—*H. C. Brooke.*

HERONS.—In reference to F. T. B.'s communication about herons, in the January issue of SCIENCE-GOSSIP, I beg to state that a lady acquaintance of mine can fully endorse his informant's statements respecting these birds, their sitting upon their nests with a leg hanging down at each side, having herself seen, either at Ullswater or Rydal Mount, these birds in exactly the same posture.—*A. M. P.*

HOUSE SPARROWS.—I note C. Kingsford's query about sparrows. The house sparrow had been introduced into many of our American cities and has multiplied greatly. In my yard a pair have nested for two years past, the male bird having white wings, the effect of which is very pretty. I have watched the pair with interest, to note if the variation would repeat itself in their offspring, but that has not been the case. The whole of the wing feathers appear to be white.—*William Kite, Germantown, Philadelphia.*

HAIR-BELL AND HARE-BELL.—In reference to this interesting question, I offer the following few remarks. The name hairbell is, I think, much more applicable to the fragile *Campanula rotundifolia* than that of hare-bell, which in my opinion refers rather to *A. nutans*, the common hyacinth. It is without doubt, as Mr. Ellacombe in his "Plant Lore" remarks, the hyacinth that Shakespeare mentions as the "azur'd harebell," and Shenstone, I find, uses the same orthography when speaking of the same flower.

> "I seldom have met with a loss,
> Such health do my fountains bestow;
> My fountains are border'd with moss,
> Where the harebells and violets grow."

In Wilke's "Encyclopædia Londinensis," vol. x. published in 1811, the *Hyacinthus non-scriptus* is mentioned under the name of common hyacinth, or harebells. In vol. iii. of the same work, the *Campanula rotundifolia* is called the round-leaved bell-flower, and no mention is made of it by the name of "harebell." I, therefore, conclude that the name harebell (which seems to be the older of the two) was originally given to the wild hyacinth; and that it has in more recent times been erroneously applied to *C. rotundifolia*, the proper name of which should, I have no doubt, be spelt hairbell.—*T. P. Dotchon.*

WHITE HEATHER AND HAREBELLS.—Seeing, for the last few months, several interesting paragraphs in SCIENCE-GOSSIP relating to white heather and the harebell, perhaps the following may be of interest to your readers. Some few years since, when searching for plants in Lochar Moss, about five miles from the town of Dumfries, I came across a goodly-sized patch of white heather in full bloom; the plants were very luxuriant, even healthier-looking than the common purple were, the foliage being of a more vivid green. I saw two or three more plants, but they were of a more stunted growth. I have also gathered white specimens in the neighbourhood of Thornhill, more especially on the western side of the Closeburn Hills, which run south to north in Dumfriesshire, and I remember when out for a long walk one Sabbath afternoon, while climbing the southern flank of Carrick Fell, coming across a large patch of pure white ling (*Erica cinerea*) growing on the face of a steep declivity, with here and there the red soil appearing. We gathered some splendid specimens, and left the remainder alone in its virgin beauty. On the Glass rigg, a long stretch of bleak moorland at the base of these hills, I have often come upon single plants of white heath, and sometimes nearly white flowers of the cross-leaved ling (*Erica Tetralix*), and many a white flower of the delicate harebell (*Campanula rotundifolia*), Scotia's bluebell as the poet sings; and whether it be spelt hairbell, airbell or harebell, matters not. bluebell and harebell are the names taught me in my boyhood, and they have, at least to me, the most poetical relation to colour and habitation of the plant, for loves it not to bloom where hides the limping hare? and a patch of these white bells have appeared for a few years regularly by the Lovers' Walk, a pathway leading through Holmhill wood, close to the village of Thornhill. In this same sylvan retreat, white specimens of *Hyacinthus non-scriptus* are to be met with. The name by which this plant is commonly known in mid Nithsdale is that under which the poet Tannahill thus sings of it, and which is a correct description of its favourite haunts, for, to the rural botanist, "dewy dell" and crowflower are nearly synonymous terms.

> "Sweet the Crawflower's early bell
> Decks Glenipper's dewy dell."

—*John Brown, Sunderland.*

White Heather.—Referring to the remarks of John G. Sharp, white heather is rare in the south of Scotland, but I have found it two or three times among the hills in Eskdale, Dumfriesshire, and once among the hills near Hawick. It is, however, looked upon as quite a find by the residents in these districts. —*G. R. R.*

Cure for Adder bites.—Reading the remarks in your last issue on eye-stones brought to my recollection a curious cure for adder bites. When spending some time among the Roxburghshire hills, I found that the shepherds amongst whom I had occasion to be were in the habit, whenever a dog was bitten by an adder, of taking it to a man who had a piece of wood which had, or was supposed to have, the virtue of healing the bite, and removing in a very brief period all effects arising from it. These men had implicit faith in this, and some of them assured me that they had possessed dogs which were cured by having the bitten place rubbed with this wood.—*G. R. R.*

The Birds of Jersey.—In looking through Mr. Lovett's interesting papers on the natural history of Jersey in the last few numbers of Science-Gossip, I observe in his notes on the birds, which, as he says, are necessarily short and cursory, he mentions the golden eagle as having been recorded as occurring in Jersey in 1849 and 1856, but he does not say that he has seen either of the specimens so recorded himself, nor does he say whether they are preserved and still in existence. Now, I admit I am not a little sceptical as to the occurrence of the golden eagle in the Channel Islands. All the Channel Island eagles I have seen have turned out, as did the so-called golden eagle at Dare in Somerset, mentioned by me in Science-Gossip for 1875, immature white-tailed eagles, which bird occurs not uncommonly in the Channel Islands in the autumn, in the immature dress in which it is so frequently mistaken for the golden eagle. The golden eagle is not mentioned in Professor Ansted's list. I admit this list is not very reliable, but it usually sins much more in admitting species without sufficient evidence, than in including those birds which had any claim, however slight, to be included in the Channel Island list; and I am sure, had he, or M. Gallienne, who assisted him a good deal in writing his list of Channel Island birds, had any evidence of the occurrence of the golden eagle in any of the islands it would have been found in the list. Perhaps, however, Mr. Lovett would kindly give us some further information on this subject. I should also be a little doubtful about the kite being "frequently seen." It may possibly make its appearance now and then in one or other of the islands, though I have never been able to gain any satisfactory evidence of its occurrence, and consequently omitted it from my "Birds of Guernsey," although I know Professor Ansted includes it in his list and marks it as occurring in Guernsey. The common buzzard, which occurs in most of the islands almost every autumn, is frequently spoken of as the kite. May not this have led to a mistake, especially as Mr. Lovett does not appear to have seen the bird either dead or alive himself? He is quite right in saying the starling is a winter visitant; but it is not a winter visitant only, as a few certainly remain to breed in Guernsey, and I should think also in Jersey, as I have seen several eggs in different collections quite recently taken in the former island. In some years the flocks of starlings which arrive in the islands in the autumn are very much more numerous than in others. This was especially the case in Guernsey and Alderney in the autumn of 1871, and I suppose in Jersey also. I saw many large flocks, especially in the evening, when they were beginning to seek a roosting-place, and had, as they do in England, collected in enormous flocks, after a good deal of the usual flying and wheeling about fly off in the direction of Jersey and the French coast, and they certainly continued their flight in that direction as long as I could follow them with my glass; but whether they were going to seek a roosting-place and to return in the morning, or whether they continued their migration and their place was supplied by other flocks during the night, I could not tell, but certainly there never seemed any diminution in their numbers during the whole time I was there (from the 1st to the 16th of November). Their migration seems to extend over a considerable time, according to the lighthouse keepers' reports last year, from August to December: the reports being as follows: "at the Casquets, Oct. 13th to 17th, midnight, rain; starlings amongst other birds to N.W.; at Hanois Light Aug. 14th, night, with many others, Dec. 2nd, midnight; half a dozen struck." Amongst the grebes I should think Mr. Lovett might have included the eared grebe, which is certainly a not uncommon autumn and winter visitant to Guernsey, and I can see no reason why not to Jersey also; but it generally occurs in the winter dress, in which it may be easily mistaken for the Slavonian grebe. The great crested grebe is by no means rare in autumn and winter in Guernsey and the adjacent islands; but not so common, I think, as on the South Devon coast. Mr. Lovett does not say whether by merganser he means the goosander or the red-breasted merganser; both, however, are common in the islands in autumn. The turnstone is, as Mr. Lovett says, abundant in autumn and winter, a few remaining throughout the year, and, I believe, though I have not been able actually to prove it, occasionally breed there. I have seen the old birds about with the young in July; of course the young could then fly. I have also seen them in June in full breeding plumage and apparently paired; I also saw a pair, male and female, which had just been shot in the island of Herm on the 17th or 18th of June; the female with eggs just ready for extrusion. Had not this pair of turnstones been shot somewhat in defiance of the Guernsey Bird Act, in which they are included, I think I should have had a fair chance of finding the eggs. Mr. Lovett seems to dismiss the gulls, which form such a striking feature in the scenery of the Channel Islands at nearly all times of the year, in rather a summary manner. He says: "amongst the best we may notice the gull." Query, what gull? "The great black-backed gull and the lesser black-backed gull. The kittiwake herring and common gulls are very common, and the laughing gull frequents the northern coast." I am not quite certain what gull is meant by this last; if *Larus ridibundus*, it is common enough in all the islands, in autumn and winter; though, as far as I know, it does not remain to breed in any of them. The kittiwake and common gull, which are also very common in autumn and winter, do not breed there. A few pairs of great black-backs breed mostly on isolated rocks which are difficult of access. The lesser black-back is also tolerably numerous; and breeds in several places; but the eggs, though protected by the Guernsey Bird Act, are much robbed by the fishermen, indeed, so much so as almost to endanger the species becoming extinct in the islands, except as an autumnal and winter visitant. The herring gull is by far the most numerous of all the gulls in the Channel Islands at all times of the year, breeding in considerable numbers in all the islands. In regard to the great bustards mentioned by Mr. Lovett as having been shot in Jersey on December 8th, 1879, the following extract from the *Bulletin de la Société Jersiaise* may be of interest to some of your readers, as I do not think it has appeared in the pages of SCIENCE-GOSSIP. The natural history committee of that society report that "two female great bustards were shot on the 8th of December, 1879, during very severe weather in the meadow near Samaves Manor. They were first observed feeding in a field of brocoli near St. Clement's Church, and were again sighted in a field of swedes, the tops of which they were seen to eat. They went down to the meadows, where they were shot. On being opened their crops were found to contain ivy leaves, pimpernel weed, and other green food." Wandering flocks of great bustards appear occasionally to have found their way to the Channel Islands on other occasions, as they did in North Devon in December, 1870; for Mr. MacCulloch wrote to me not very long ago that M. Rougier of Les Eperons, St. Andrews, Guernsey, assured him that about forty years ago he had seen and shot in the fields on his estate several specimens of the large bustard. He is well acquainted with the small bustard, and says the country people looked upon the large sort as a species of wild turkey. Mr. MacCulloch adds, "one would like to know whether about that time flocks of them had been seen in Brittany." It would be also interesting to know if there is any record of the occurrence of the great bustard in Jersey about that time. Perhaps Mr. Lovett, or his friend Mr. Sinel, could give us some information on this subject. A good many great bustards occurred in various parts of England about the same time as the Jersey ones mentioned by Mr. Lovett, and some in France, but nowhere near the N. coast. These were all recorded in the "Zoologist" for 1880. Neither the great bustard nor the little bustard, which has occurred several times in the Channel Islands, are mentioned in Professor Ansted's list, or in M. Gallienne's remarks on some of the birds in that list. I hope Mr. Lovett will excuse me for these remarks on his short notes on the birds of Jersey, especially as I have not worked the birds of Jersey as much as I have those of Guernsey and the other islands, but it strikes me that it would not be safe to include the golden eagle (and perhaps not the kite) in a list of Channel Island birds without further evidence.—Will you add to my remarks on Mr. Lovett's notes on the natural history of Jersey, as to the starlings being not entirely winter visitants, but partially resident, at all events in the island of Guernsey, the following extract from a letter I received yesterday from that island: "A large number of starlings are building their nests in the neighbourhood of the Woodlands. I have never seen so many before:" the letter is dated March 14th, 1882. It quite bears out what I have said, that the starlings are not entirely winter visitants to the Channel Islands.—*Cecil Smith.*

SWALLOWS' NESTS.—In your last number of SCIENCE-GOSSIP there are two or three notices of remarkable places in which swallows have built their nests. Perhaps the following would be worthy a place in your journal—"Last summer, when on a visit to Lincolnshire, and going over my father-in-law's garden (he is a large gardener), I had pointed out to me a swallows' nest built amongst the works of an old clock which hung up in the summer house. The clock, of course, had been out of use for a considerable time, and the swallows had taken possession of it. The birds were not disturbed, and were allowed to rear their young ones." As mentioned in the note by Mr. Batchelor, the birds did not go in and out when the door was open, but whenever one closed the door, they commenced their visits to the nest as if nothing had occurred to disturb them.—*Wm. Hampton, F.C.S.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

E. J. TYE.—Yours was not an "exchange," but a cash advertisement, and therefore we could not gratuitously insert it.

B. K. N.—You had best offer something good in exchange in our columns, and we have no doubt some of our correspondents could furnish you with the skeleton of a frog.

A. H. TODD.—The appearance of the landrail on Easter Monday is unusually early, but then we may expect most of our summer migrants to put in an early appearance this year. We ourselves heard the nightingale before the end of March, and the wryneck in the Wye Valley on Easter Tuesday.

J. P. JOHNSTON.—Mr. Saville Kent's "Manual of the Infusoria" has completed five out of the six parts, and the sixth will be out in a week or two. When completed there will be nothing of the kind to equal it. By all means secure it.

L. FRANCIS.—The "Micrographic Dictionary" will be completed in twenty-four parts; the parts are 2*s.* 6*d.* each. It is a complete cyclopædia on everything relating to the microscope and microscopical investigation.

J. FIREY (New York).—"Eno's Fruit Salt" is a well-known effervescent salt sold in Great Britain. It is said to be composed chiefly of bi-tartrate of potash. It is sold in bottles, and may be obtained of any druggist.

F. BATES.—Get Cooke's "Ponds and Ditches," price 2*s.* 6*d.*, published by the Christian Knowledge Society. Slack's "Pond Life" is a capital work. So is Gosse's "Evenings with the Microscope" (Christian Knowledge Society).

J. L.—The best stuff with which to make your wooden aquarium watertight would be hot pitch, which should coat the interior to the thickness of about one-eighth of an inch. It is very easily done, and is recommended in Taylor's "Aquarium," page 37.

E. H. SMITH.—You could not do better than go to the Malverns, and study the geology of the lower and upper silurians. There are dozens of quarries and outcrops of strata, full of silurian fossils, within the range of half a score of miles; Woolhope is only about fifteen miles away, also a good fossilising locality.

WILSON NOBLE.—A capital plan to obtain the skeletons of small mammals is to skin the bodies and place them in ponds where tadpoles are abundant. The latter eat away the flesh without disturbing the bones, only the process must be well watched. You will find Tulk & Henfrey's "Anatomical Manipulation" (published by Van Voorst) a capital handbook and guide. See Dr. Günther's "Introduction to the Study of Fishes" for instructions as to preparing them. Chapters in "Notes on Collecting and Preserving Natural History Objects" (published by D. Bogue, price 3*s.* 6*d.*) relate to osteological preparations, the preparation of land and freshwater shells for the cabinet, &c.

J. A. OLLARD.—The "remarkable tree" of which you speak, which is said to have the power of drawing up bones, &c., is one of the nuisances of a journal like ours, and is always cropping up. The story is on a par with that of the "upas-tree" of Java, which has gradually been heard less of as we have known more of Java. The "remarkable" natural objects observed by missionaries always require to be accepted with caution.

W. J. W. S.—The "small blister-like pieces" on your fern leaf are not fungus, but "scale-insects," or the female of *Coccus squamifer*, whose body becomes a cocoon-like shelter for the eggs she lays. The fern appears to be a tropical Pteris, but the fragment is too small to identify.

A. JENKINS.—The sketches (which are very vigorous and accurate) are those of a stalked Infusorian, evidently *Epistylis anastatica*.

R. A. DEMPSEY.—We do not recommend you to try a solution of chlorate of potash for your flowers. There is nothing like complete drying and frequent changing of paper. You will not be able to do this effectively without a press—it is impossible to get rid of the moisture otherwise than by using one. See two capital articles in SCIENCE-GOSSIP for 1878 by Mr. J. W. Buck, B.Sc., on "How to Make a Herbarium."

EXCHANGES.

WANTED in exchange, fungi from wheat, mounted or unmounted; also various diseases of wheat.—A. Smith, The Laboratory, Essex Road, N.

WANTED, the following British lepidoptera: *Z. esculans, C. viduaria, A. circellata, F. conspicuata, E. tæniata, P. polygrammata, D. bicuspis, A. alni.* Lepidoptera and birds' eggs in exchange.—W. K. Mann, 10 Wellington Terrace, Clifton, Bristol.

BRITISH land and freshwater shells and some marine offered for a really good specimen of beryl, crystal form.—F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

WILL exchange well-cut and correctly-named wood sections for sea soundings or any micro matter unmounted.—Hickin, 1 Tamworth Villas, Hornsey Road.

WILL exchange nine trays, which contain 680 minerals. In want of British birds' eggs (side blown), or an entomological cabinet. What other offers? No live stock.—J. Fogg, 14 Upper Fountain Street, Leeds.

FOR *Nitella glomerata* (showing cyclosis), *Ophrydium versatile, Hydra fusca*, &c., send mounted freshwater alga.—C. L. Lord, 1 Burlington Crescent, Goole.

WANTED, a Swift's Bent Double Nosepiece; Davis's "Practical Microscopy" (new) and others in exchange.—J. S. Harrison, "Gazette" office, Malton, Yorks.

WILL exchange first eighteen numbers of "Knowledge" for good dissecting scissors.—Lester Francis, 20 Frogmore Street, Abergavenny.

A VARIETY of fresh diatomaceous material from Lough Neagh and neighbourhood for good botanical slides.—H. W. Lett, Ardmore Glebe, Lurgan.

SILICIFIED wood from Lough Neagh, Ireland, offered for other fossil woods.—H. W. Lett, Ardmore Glebe, Lurgan.

WANTED, "Popular Science Review," 1st series, Nos. 7, 11, 12, 13, 14, 29.—E. S. A., 3 St. Martin's Place, London, W.C.

GOOD American bird skins, eggs, and nests, also a many Indian eggs and a few good English ones, to exchange for other English or foreign ones not in collection.—G. A. Widdas, Woodsley View, Leeds.

WANTED, to exchange three dozen splendid pathological slides, injected, for slides of diatomaceæ and miscellaneous objects—must be first class. Descriptive list can be had.—James Brabyn, Inland Revenue Office, Sunderland.

SCIENCE-GOSSIP micro mounting machine and twenty-nine 1-inch block sections, Australian wood (some stems), for micro photos from statuary, church interiors, and painting subjects. What offers?—T. S. R., Office of SCIENCE-GOSSIP.

SET of Australian mineral specimens and twenty-nine block sections, Australian wood (some stems), for mounted slides of polariscope minerals.—T. S. R., Office of SCIENCE-GOSSIP.

FOR fruited specimens of English and foreign ferns, the following from the Santa Cruz Mountains, California:—*Adiantum emarginatum, A. pedatum, Gymnogramme triangularis, Pellæa andromedæfolia, P. ornithopus, Polypodium vulgare, Aspidium aculeatum*, var. *angulare, A. rigidum*, var. *argutum, A. munitum*, var. *nudatum*. Will receive orders, to be supplied later in the season, for *Cheilanthes Californica* and *Cheilanthes gracillima*.—J. Edward Reed, Wright's Station, S.P.C.R.R. Santa Clara Co., California, U.S.A.

Helleborus viridis, Gagea lutea, Ophrys apifera, for other dried plants, especially vars. of *Rosa, Rubus, Salix*, and *Carex*.—Rev. J. M. Hick, Staindrop, Darlington.

WANTED, the volume containing the account of the late Mr. John Wolley's collection of birds' eggs (from griffon vultures to owls).—H. H. Collinge, Mount Preston, Leeds.

FIRST-RATE mounted slides given in exchange for material containing Arachnoidiscus in any variety, *Aulacodiscus formosus*, Glass Rope Sponge, and *Meyerina claviformis*.—J. B., 3 Gowrie Terrace, Cavendish Road, Tottenham.

WANTED, eggs of the rarer British birds, in clutches—also rare foreign stamps, singly or in collections. Can offer British and foreign butterflies, beetles, eggs, shells, &c.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

SCIENCE-GOSSIP in parts and volumes, in exchange for works on British Zoology and Botany.—W. H. Warner, Standlake, Witney, Oxon.

WANTED, *Isatis tinctoria, Ornithogalum umbellatum, Lolium temulentum*, seed of *Nigella sativa*, Molucca berries, nuts of *Staphylea pinnata*, tapa, rice paper, &c.—W. H. Tunley, Southsea.

LARVÆ of scarlet tiger-moth in exchange for larvæ or pupæ of other species.—Sidney Smith, 7 Clarence Road, Lower Walmer, Kent.

Unio margaritifer, living or dead specimens, in exchange for other British shells, eggs, or offers.—Rev. William W. Flemyng, Portlaw, co. Waterford, Ireland.

SIDE-BLOWN eggs of osprey, belted kingfisher, and other rare kinds for exchange. Wanted, peregrine falcon, &c., and many other kinds: kindly send list.—W. Wells Bladen, Stone, Staffordshire.

WANTED, living specimens and eggs of helices, also "Journal of Conchology," vol. ii., exchange slides and shells.—James Lightwood, Lytham.

A QUANTITY of newts for exchange, several species.—Edmund J. Tye, Stony Stratford, Bucks.

Stuffed golden cock pheasant, ring-necked cock pheasant and heron; also the following skins: silver pheasant, great black-backed gull, black-headed gull, wood-pigeon, kestrel, landrail, green woodpecker, whinchat, blackbird (with some white feathers). Wanted, skins of great crested grebe, black-throated diver, and gannet.—Alfred Baker, Old Bank, Tewkesbury.

I WISH to correspond with persons living in all parts of the world. My object is to exchange specimens of natural history.—W. H. Stackhouse, 1707 Beckett Street, Philadelphia, Pa., U. S. A.

FOR exchange, well-mounted sections of various woods, starches, animal hairs, &c., send lists.—R. L. Mestayer, 3 Seedley Mount, Salford.

WANTED, bearded darnel, *Lolium temulentum, Uredo Caries*, or *Uredo segetum*; diatomaceous earth given in exchange.—A. Smith, The Laboratory, Essex Road, Islington, London.

BOOKS, ETC., RECEIVED.

"Science in Popular Education." By T. Twining.
"Journal of the Royal Microscopical Society." April.
"Proceedings of the Geologists' Association." January.
"Journal of the Postal Microscopical Society." No. 1.
"Land and Water."
"Union Jack Naturalist."
"Scottish Naturalist."
"Natural History Notes."
"Midland Naturalist."
"Northern Microscopist."
"Live Stock Journal."
"Journal of Applied Science."
"American Naturalist."
"Canadian Entomologist."
"Boston Journal of Chemistry."
"Good Health."
"Botanical Gazette."
"Ciel et Terre."
"La Science pour Tous."
"Feuille des Jeunes Naturalistes."
"Cosmos: les Mondes."
"Revista." &c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 8TH ULT. FROM:—C. S.—W. H.—A. C.—J. B.—W. J. S.—W. G. W.—M. & M.—T. B. R.—J. A. W.—G. H.—T. J. H.—J. R.—J. S. H.—A. D. M.—R. D.—W. K. M.—J. E. E.—J. S. R.—M. W.—G. H. K.—M. E.—C. G.—H. H. C.—F. H. P.—W. W. W.—J. M. H.—W. J. V. V.—J. P. H.—A. S.—S. R.—F. M. H.—E. L.—J. B.—E. D. M.—G. A. W.—A. J.—R. A. D.—J. F.—L. F.—E. H.—C. B. M.—O. Q. K.—U. S.—F. S. H.—H. W. L.—J. A. O.—A. T. S.—W. N.—C. L. L.—E. H. P.—L. S. G.—A. T. H.—J. F.—R. L.—A. G. L.—F. B.—R. S.—J. G. S.—A. F. T.—W. H.—W. W. F.—W. D. S.—J. T. L.—T. M. R.—W. W. B.—H. H.—E. J. T.—F. W. H.—F. T. M.—W. K. M.—W. H. T.—B. K. N.—A. B.—E. E. E.—J. R.—W. H. W.—S. S.—E. J. T.—R. L. M.—A. S.—J. W.—W. H. S.—&c.

WATER SNAILS; A STUDY OF POND LIFE.

By the AUTHOR OF "PLANT LIFE."

[*Continued from page* 105.]

WE have promised to explain what are "otoliths." The reader has probably investigated the anatomy of a cooked fish, as he may be acquainted with that of a roast or boiled fowl. If at all of an observant nature, he must have noticed in the head of a fish certain "stones" of a more or less triangular form. These are the otoliths, or "ear-stones" of the fish, and they were contained in a sac or chamber filled with a crystalline fluid. In the fish these are attached to the auditory nerves. The vibrations of sound are conveyed through the water there to auditory chambers, where they pass through the crystalline fluid, and by agitating the "otolith," convey the impressions to the brain. Now if we examine our snail very carefully we shall find at the base of the tentacle a very delicate membrane sac, in which are minute calcareous bodies. These bodies are the otoliths, and they are in constant motion. They are the organs of hearing.

The whole animal is seen to be covered by a loose, dark integument, into which the head and foot can be retracted. This integument fits closely to the inner surface of the shell, and is designated the "mantle." It is this mantle that secretes the animal's shell. Here a peculiarity should be noticed. The shell is enlarged at one point only, the mouth or widest portion. As the animal grows too large for its small shell, the difficulty is not met, as in the crabs and lobsters, by casting off the tight fit and developing a more roomy apartment. Instead, the shell is lengthened at its widest part, and as it increases in length increases the width of the portion in course of formation, to allow of the proper development of the head and foot. The peculiarity we desire to note is that this addition is made by the free edge of the mantle, which alone has the power to give colour or impart a pattern to the shell. The hidden portions of the mantle, which line the shell, have the power only of thickening the shell that has been formed. If you will look carefully over the specimens which we obtained this afternoon you will find that some of the large, and consequently old, specimens have had their shells broken at some period. You can see this by these rough edged deep depressions, though the gap has been stopped by a layer of shelly matter from inside. Now the general colour of the shell is a light brown, but these patches are dirty white in hue. Here is a better instance. This larger thicker shell was formerly the residence of a land snail, the Roman snail. Now you see that this shell is marked by several dark bands running parallel throughout the length of the spire. But here is a patch, the result of an old breakage, and here you see the lines are interrupted and the patch is of a uniform dirty tint. Now that patch of an odd colour let in there tells its own story. That fracture was made long after the surrounding portions of the shell were formed and hardened; because, if the fracture had occurred to the soft, newly-formed edge of the shell, it would have been repaired and coloured in harmony with the rest of the shell.

The shell is composed largely of carbonate of lime mixed with animal matter. In fact the shell consists of the upper layers of the mantle which have been thrown off, after the cells have been filled by a deposit of carbonate of lime. Now the shells of these water snails are very thin and more horny than stony in texture, from the small amount of lime contained in them. All pond snails agree in this respect, and the reason is easily found. Molluscs, whether they are land, freshwater, or marine species, obtain their lime from the plants on which they feed. These have previously extracted it from the water or the earth. Nearly all sea-shells are thick and heavy, those of the land neither so thick or so heavy, whilst freshwater shells are very thin and very light. In the sea there is an abundance of carbonate of lime held in solution, and ocean-plants contain large quantities of it. Marine molluscs subsist on these ocean-plants, and consequently a large amount of lime enters their system. This lime is secreted by the outer surface of the mantle, and after it has been exposed to the air for a short time it becomes hard. With respect to land-snails, we find that in clay districts they are either rare and thin-shelled, or absent altogether. In chalky districts, on the contrary, they are usually abundant and the shells are relatively thicker. One species, our largest native snail, is only found in the chalk districts, and is especially plentiful on the North Downs. This is the Roman snail, a species said to have been introduced by Cæsar's legions on account of its high character in the eyes of the Roman epicures. The shell of this species is very thick and solid, in comparison with that of other snails. From these statements it is easy to understand why our pond-snails are thin-shelled, for ponds with clay bottoms contain but little carbonate of lime. But, in addition, ponds of still water in which there is decaying vegetation and animal matter usually contain large quantities of carbonic acid gas, which is very destructive to lime. Instances of this may be seen among these pond-snails before us, for some of them have the tip of the shell all eaten away, or eroded. This is solely due to the action of carbonic acid gas upon the lime.

But why is it only the *tip* of the shell that is thus eroded? Why does not this carbonic acid gas attack the lower and wider coils of the shell? The whole shell is protected by a layer of animal matter—the epidermis—which is endowed with life, and therefore proof against the attacks of this acid. But at the tip of the shell—which was formed by the snail when very young, this epidermis is very thin, and consequently more easily destroyed by the acid. Spiral shells are frequently found with the first few whorls completely missing, and in the flat discoidal trumpet snails specimens may be seen with a hole through the centre where the shell has been removed.

Now let us take a glance at the history of our water-snail. Every individual in itself combines the functions of both sexes, and in summer they may be seen depositing long curved cylindrical masses of a clear jelly-like substance on the walls of their tank. Should this be of glass we may examine them without removal. Applying our lens to the glass we shall observe that a great number of minute clear globules are dotted throughout its substance. These globules are none other than the eggs or ova of our water-snail, each one containing a germ of life, destined to pass through a regular and well-marked course of development until it arrives at full-grown snail-hood like its parent.

Let us place one of these spawn-masses upon a glass slip and then on the stage of our microscope. For such an object we require what is known as a low-power objective, that is, one of the least magnifying power. We fix on the one-inch objective and carefully focus a single ovum or egg. It is revealed to us as a large oval vessel filled with a clear prismatic liquid, the albumen. At one portion of this vessel, which we may term the egg-shell, is a denser globular mass which is the yelk. Within this is a part still more dense, the germinal vesicle, with a clear central space or nucleus. This germinal vesicle is a single cell, and from a similar single cell every animal and every plant is developed. However widely organic forms may differ in the adult state they may all be traced back through a series of gradual changes to a solitary little cell, scarcely differing in appearance from this cell before us. The lowest form of animal life with which we are acquainted consists of one cell only and never gets beyond it. So, too, the lowest forms of plants are unicellular. It should also be borne in mind that all forms of life are reproduced by the division of these cells. There is no such phenomenon as spontaneous generation. No living cell can be produced save by the division of an already existing cell.

Now we will have another look at our germinal vesicle, or perhaps it will save time to speak of it as the *embryo*. There is the *embryo* in the yelk suspended in the albumen. Now let us leave it and inspect it again in a few hours' time. We shall then find that the embryo is dividing, or has divided, into two equal portions or cells each with the clean central space. Next day we shall find that each of these two cells have, in their turn, divided in like manner, so that we have four cells contained in the enveloping membrane of the yelk. Next we find a group of eight cells, then sixteen, and so on, always increasing in multiples of four until at length we have what biologists term a "mulberry mass." At this stage the cells are too numerous to be counted, and form a mass much resembling a mulberry or blackberry. By-and-by the yelk develops from its outer surface a band of very delicate filaments, or *cilia*. By the lashing of these cilia rotatory motion is imparted to the embryo and it takes several turns to the right, and then reverses the engine and makes as many revolutions to the left. Henceforth there is continual motion in our embryo, although as yet it is totally devoid of organs. It is still a mere aggregation of cells, without these cells being arranged into tissues or vessels. But soon it shows a disposition to lengthen in one direction and assumes a bi-lateral symmetry. A little later it shows indication of a division into anterior and posterior portions. The large cells are divided and broken up into very much smaller ones, and these form into groups, which finally become developed into organs. Now the shell is seen to form as a very thin layer over one portion of the embryo, and, growing, takes a nautiloid form. Into this shell the whole of the embryo soon contracts itself, and meantime the differentiation of cells into organs proceeds. By the time the embryo is completely withdrawn into its shell, the stomach, liver, and intestines are clearly visible, so also is a large muscle which attaches the embryo to the shell. It has now the power of movement by the alternate contraction and dilatation of its broad "foot," and it continues to perambulate the egg-sac until the rupture of the latter sets it free. But although its form and power of movement might lead us to believe that it is a complete snail, this is not the case. As yet it is totally devoid both of *nervous* and *circulating* systems. These, however, rapidly follow, and our little snail is full-fledged. It is at once independent, and roams about over the surfaces of plants and stones, cropping the tiny growths of algæ, and the leaves of larger water-plants.

The figures given in our last number represent a series of stages in the development of the embryo, sketched from the microscope. It may be interesting to note, that what is known as the "foot" of the snail is shown by this embryonic development to be really *an under-lip*.

A SKETCH OF THE FLORA OF THE COAL PERIOD.

By Rev. J. Magens Mello, M.A., F.G.S., &c.

To form a true idea of the flora of any one of the past geological periods is an undertaking of no easy nature, and the task set before a palæontological botanist has been vividly described by Unger. "Imagine," he says, "the remains of a great forest, rich in trees and bushes of all species, in which all would be thoroughly commingled, confounded and heaped up together, twigs, branches, leaves, buds, bracts, scales, flowers, fruits, seeds, of the most varied sorts, as well as pieces of bark and wood; and this chaos of vegetable matter will hardly give an idea of that which the palæontologist has to unravel in order to recover the hidden meaning, and restore all to its natural aspect, in a word to reproduce each plant as it was when living." Besides all this, the very remains we have are themselves for the most part in a very imperfect and fragmentary condition. Another point which must be borne in mind in endeavouring to restore an extinct flora is that the majority of the more herbaceous plants have left hardly a trace of their existence, although they must doubtless have been abundant, and in all probability have borne the same ratio to other plants that they do at present. A great source of difficulty is the fact that it is not always easy to describe a plant from even such a perfect fragment as a well-preserved leaf, or piece of its wood. Many different families have very similar leaves, which even in a living state would be practically undistinguished from one another; the broad division between endogens and exogens, or between these and cryptogams can indeed be made out, but very little else. It is pretty nearly the same with the woody structure: some families, such as the Coniferæ, can be recognised by the character of the wood, and, as in the case of leaves, the distinction is readily made between the greater divisions of the vegetable kingdom; but to say that such and such sections of wood belong to this or that tree respectively, is more than we have as yet arrived at, whatever may eventually be the case. Were the flowers of the various plants frequently met with in a fossil state we should perhaps have a somewhat easier task, but these are rare indeed. Fruits and seeds are found in greater or less abundance in certain beds, and these are sometimes sufficiently well preserved to enable us to say something as to the nature of the plant to which they belonged.

The Carboniferous Flora.

Previous to the Tertiary period, the vegetation of which has to a large extent been recovered, the rocks of the coal measures have yielded the most abundant collections of vegetable remains preserved in the earth's crust.

It has now been long known that all ordinary coal, whether found in rocks of the Carboniferous age, or in those of later date, betokens an extraordinary development of plant life under highly favourable conditions, and that this coal has been formed by a series of chemical changes, carried on through an incalculable period of time; by which the life of former ages has been transformed by a process of condensation of the carbon, the stages of this condensation being in part shown by the gradation of peat into Lignite, and thence to Cannel, Bituminous and Anthracite coals.

To produce the vast thickness of vegetable matter constituting some of our coal seams there must have been required the successive growth and decay of many thousands of years, and judging from the nearly uniform nature of the coal formation and its flora, in widely separated areas, it would appear that there must have been nearly uniform, although not necessarily simultaneous conditions prevailing over the greater part of the earth's surface.

The remains of the Carboniferous flora are found preserved in sandstone and shale, and in the coal itself. Many years ago, Professor Göppert is said to have detected in beds of pure coal remains of plants of every family then known to occur fossil in the coal measures.

Climate.—The fossil flora of the various epochs affords some indications of the prevailing climates, and we are at once struck by the somewhat tropical appearance of the plant remains of the Carboniferous period, which evidently betokens a warmer and more equable climate than is now experienced in many of the countries where coal is found. Wondrous changes in the distributions of temperature must have taken place since the days when Novaya Zemlya and Spitzbergen were covered with the dense growth of the coal period.

It may be that the normal temperature of the earth itself was then somewhat warmer than it now is, and also that the atmosphere was more highly charged with aqueous vapours than at present, producing a climate highly favourable to the development of a Cryptogamic flora; and the Carboniferous period may, without much exaggeration, be characterised as the Age of Cryptogams.

THE FLORA.—We will now examine somewhat in detail the more prominent plants which have been recovered from the chaos of the coal fields. Amongst the most beautifully preserved of the Carboniferous plants are numerous Ferns, closely resembling in general appearance existing species. Various genera of Equisetaceæ (Horsetails), Lycopodiaceæ (Club mosses) and Coniferæ, all of which have their analogues still existing, and side by side with them, are other plant remains of more or less doubtful affinities.

The Ferns.—The ferns of the coal measures were perhaps mostly herbaceous, and of the ordinary size of the common European species; not more than two or three undoubted arborescent species, I believe, have been found in this country, and of them only portions are known for certain, although it is not unlikely that some of the fragmentary fronds may have belonged to arborescent forms. Schimper argues indeed that since the arborescent ferns of New Zealand are often without fructification, and that the majority of the coal-measure ferns are similarly destitute, and also belong to families which are rich in living arborescent species, therefore there may have been a great abundance of these tree-ferns during the Carboniferous age. The number of ferns that have been obtained from the coal measures is very large; at least 250 species are known, whilst Europe to-day possesses only sixty indigenous species. Before entering into further details as to the ferns of the coal measures, it will be well for us to notice the general characters of this order of plants, especially with a view to the recognition of microscopical specimens.

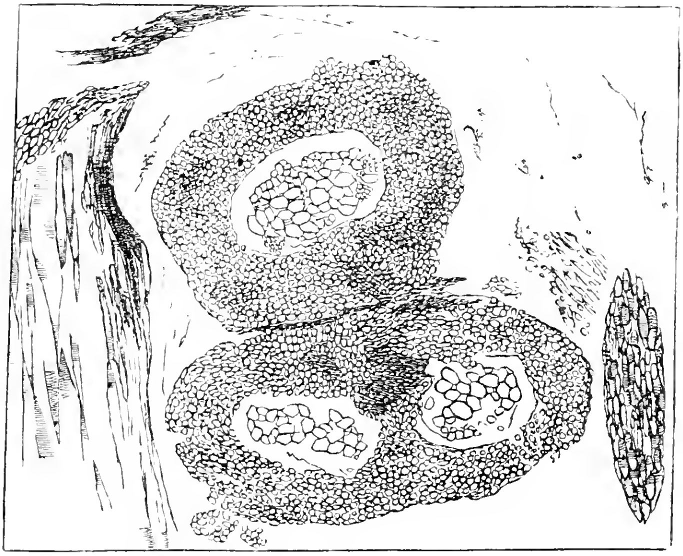


Fig. 83.—Rachiopteris. Transverse section of Fern-stem. × 26 diam.

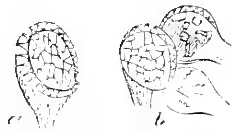


Fig. 84.—Sporangia of Ferns. *a*, *Hymenophyllum Tunbridgense*; *b*, Fossil ditto, Oldham.

The ferns form a group of plants which is acrogenous, that is, it increases by successive additions at the apex. *Externally*, ferns are seen to have a Caudex or Rhizome, which creeps below the surface or upon it, and has very much of the appearance of a root, but it is really a prostrate stem, and from this spring the leaves or fronds which are borne on a stipes or stalk.

The caudex is sometimes very large as well as erect, and rises like the trunk of a tree, it is nearly uniform in circumference throughout its length, and is marked symmetrically by the scars produced by the bases of decayed fronds.

Internally, the structure of a fern consists of a central medulla or pith, which in some species is surrounded by a regular cylinder of scalariform tissue; in others the vascular bundles are scattered about through the whole mass of tissue in detached bundles, or in plates giving rise to curiously-shaped patterns in transverse sections. Outside all is a cellular cortical layer, or bark. The woody cylinder "is penetrated by large open meshes, each of which permits the passage of the vascular bundles which supply a leaf, accompanied by a certain amount of cellular tissue from the medulla which occupies the centre of the mesh." "The leaves of the fern bear the fruit and are hence called fronds, and the fruit is produced in clusters on the back or margin of the fronds. Each cluster contains many sporangia and each sporangium numerous uniform spores. These spores in the least as well as in the largest species are remarkably uniform in size."*

The microscopical structure of the fossil ferns

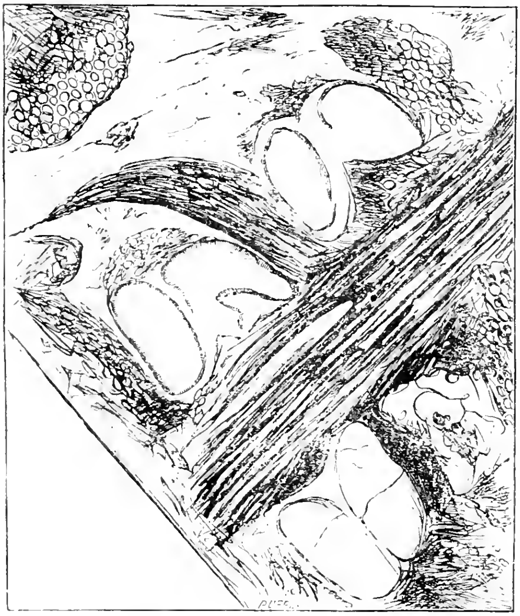


Fig. 85.—Longitudinal section of Strobilites.

agrees most unmistakably with that of existing species. Spores are however but seldom met with attached to the fronds. I have seen specimens in the Owens College Museum, at Manchester. When they do occur they are seen to resemble in the closest possible manner those of living species in their modes of attachment and general appearance. Detached sporangia of the genus Hymenophyllum have been found at Oldham, although the parent fronds have not been recognised. When we turn to the group of arborescent ferns, we find "that the vascular elements of the stem form a close cylinder round the pith, and the vascular bundles for the leaves are given off from the out-turned edges of the cylinder when, at regular intervals, corresponding to the positions of the leaves, narrow meshes occur for this purpose. In another group of the Carboniferous ferns the ends of the vascular plates, as seen in transverse sections, turn inwards, and the leaf bundles are formed in a complete condition in the axis of the stems."

* Carruthers.

It is owing to the general absence of fructification that the classification of the Carboniferous ferns is attended with so much difficulty. We have almost entirely to depend on the venation, or arrangement of the veins in the leaflets, and this is not only very varied, but there is such a gradual shading off of one type into another, that to say where one genus should end and another begin is almost impossible; besides this, it is a known fact that the same arrangement of veins is now found in as many as five or six different genera which have been determined by their fructification.

The simplest general classification as yet proposed for these fossil ferns is that of M. Brongniart, which as far as I am aware has not been replaced by a better. He divides them into four classes, of which the following are the characters:—

1. Frond simple, or with free or adherent pinnules; no medial vein, or with a medial vein at the base, but diminishing and disappearing towards the apex. Venules dichotomous, flabelliform. Neuropteridæ.

2. Frond pinnate, bi-tripinnate, pinnules contracted at the base, flabelliform, whole or slightly lobed; veins diverging from the base, mid-vein not more distinct. Adiantidæ.

3. Frond, as above. Veins pinnate or bi-pinnate near the base, secondary divisions very oblique. Sphenopteridæ.

4. Frond simple, pinnate or bi-tripinnatifid, pinnules generally adherent by their base to the rachis, often confluent, and merely forming more or less deep lobes, whole or denticulated without lobes; secondary veins (venules) pinnate, dichotomous, or reticulated. Pecopteridæ.

There is a more elaborate classification based upon this by Ettingshausen, which may be referred to in Schimper's great work on "Vegetable Palæontology," to which I am largely indebted in the compilation of this paper.

Besides the more or less perfect fronds of carboniferous ferns, there are found numerous fragments of the rachis or stems of various species or genera, such as Caulopteris, Megaphytum, Zippea, and others.

Equisetaceæ.—We must now turn to another division of plants, belonging to the coal measures, the Calamites; fragments of these are very abundant, and belong to several different genera. Fortunately, not only is their internal structure frequently sufficiently well preserved to enable us to examine its minutest details, but the foliage and the fruit have also been recovered. In appearance these plants resembled gigantic Equiseta or horsetails, and there can, in fact, be no doubt that it is to this order of the vegetable kingdom they must be referred, although possessing a more highly developed structure than the modern horsetails. The Equiseta are strange plants, having at the present day but one single genus with no definite links allying it to other Cryptogamic orders. In the Carboniferous period they must have proved an important item in the vegetation, and many of them grew to a vast size, and probably formed dense forests over the low-lying marshy flats of the period. The few living species of Equiseta are, for the most part, small insignificant weeds, although some one or two of the American species attain a height of several feet.

The recent plants "have slender, hollow, and jointed stems, each joint terminating exteriorly in a toothed membranous sheath composed of leaves reduced to this elementary state; whorls of branches or branchlets are given off at the joints in some species, with small leaves pitted transversely with stomata. The fruit is produced in terminal cones, composed of numerous stalked peltate scales, each of which has, on its under surface, a circle of sporangia, filled with numerous uniform spores; the spores have a spiral covering, which when ripe breaks up into four clavate hygrometric threads, called elaters."* The interior of the stem is characterised by having a diaphragm of vascular tissue dividing it at each joint; this is seen to be formed by a more or less distinct central pith with an exterior fibrous cylinder, in which are usually found two rows of longitudinal lacunæ or meshes, which seem to correspond with the furrows and ridges of the stem.

Let us compare with this description the structure of a calamite. The trunk of a calamite was also jointed, and bore scars along the joints from which whorls of leaves, or leaf stalks proceeded. The stem, however, was not hollow like that of the horsetail, but solid, and consisted of a central pith, surrounded by a woody cylinder, built up of scalariform vessels, and having a thin cortical layer on the exterior with lacunæ or air cells, the intervening tissue containing tubes marked with numerous pores. "The medulla penetrated this cylinder by a series of regular wedges which were continued as delicate laminæ of one or two cells in thickness to the cortical layer; these cells had their longest diameter in the direction of the axis. The wedges were continuous and parallel between each node. As the axial appendages were produced in whorls, the only interference with the regularity of the tissues was by the passing out through the stem at the nodes of the vascular bundles which supplied the leaves, and as the leaves were usually opposite to the interspaces of the whorls above and below, there was at each node a re-arrangement of the wedges." †

(*To be continued.*)

* Carruthers. † *Ibid.*

CHARLES DARWIN.

BORN, FEBRUARY 12, 809.
DIED, APRIL 19, 1882.

FAR-reaching intellect, a mind serene,
Sublime in patience, fresh and evergreen!
Thoughts sprang like flowers from a virgin soil,
But still he delved with unremitting toil,
Searched for his facts with microscopic eye,
With power to learn, and wisdom to apply.
From things familiar he enlarged his range,
Through truths before unknown, and passing strange,
Marked how the animate creation's strife
Improved the species, giving strength and life;
Showed that the creatures which the most persist,
Are those the best selected to exist,
By means that Nature ever has at hand;
Small each effect, but cumulative grand!
Proved well each step before proceeding on,
Supplying links that make all Nature one,
Until all living things in their relation
Led him from frequent up to one creation
With depth of insight, seer-like, to unfold,
Life's history from its dawn in days of old,
With glimpses of a future yet untold.

Thoughts like to these had passed through human brain,
Before digested facts the truth sustain,
And though to some extent he missed the mark,
Much honour still is due to brave Lamarck,
For lacked he not the theory of selection,
Which to descent of creatures gives direction?
Wisely, O Darwin! thou thy work began,
And talked of *species*, when we thought of *man!*
Prepared foundations sure on which to build
Before unpleasant truth could be distilled.
For would proud man the information suit
To find he was descended from the brute?

Why waste a thought or even once repine
To find our origin was un-divine?
'Twas, no doubt, pleasant for an earthly clod
To think himself descended from a God!
As Alexander, when he grandly strove
To prove his father was Olympian Jove,
Though facts of Nature through which all are taught,
Show that the "wish was father to the thought."
Darwin has opened to the human mind
Ideal longings of another kind.
Sprung from the brute, yet with a feeling heart,
Man's destined still to fill a worthy part,
For SYMPATHY from history we find
Makes noble deeds and leavens all mankind.

Leads to effacement of unworthy self
While honest trade replaces early pelf.
To learn this lesson why should man be loth,
Increase of knowledge means the moral growth,
Then why forge chains the intellect to fetter?
To follow truth is juster, wiser, better.

Oh fertile thought! that first in Lyell's mind
Arose to teach and permeate mankind,
Gave man a hope that from effect to cause,
Through smallest change to trace great Nature's laws,
Showed how continuous action without break
Made eloquent the rocks, the ocean speak!
Showed order in disorder through the whole,
And gave to Mother-Earth a living soul.

Anthropomorphic notions of a God
That ruled his creatures with an iron rod,
Were well devised to govern stiff-necked Jews,
Who should have followed right, but did not choose.
Such infant views our souls scarce now demand,
Though in the storm we still may see His hand.
Say not that man is obstinately blind
To all but second causes close confined,
For still the Final Cause his thoughts must leaven,
And lift him up from Earth to brighter Heaven.
With sacred things true science will not meddle,
Nor even stop to guess the mighty riddle,
Humbly content with steady light to shine,
And show some beauties of the Great Design.

Thus Darwin worked, and all his mind was bent
To find the truth through full experiment,
Pushing afar into the realms of thought
With facts he laboured on, for truth he wrought,
Till Nature pleased had lifted up the veil
To show to other minds a further trail.
A nobler life of thought could scarce be found,
Calm yet eloquent, simple though profound.
Most just to others, honest to a fault,
Of scientific men the very salt,
Thy dear example, Darwin, shall infuse
New life in those who ways of science choose;
To England's honour shall these names appear,
Newton and Darwin, Bacon and Shakspere.

April 27, 1882. A. CONIFER.

EARLY NESTING.—With reference to Mr. Wheldon's account of an early or late blackbird's nest, I have in print notice of a blackbird's nest containing two eggs having been found in Cheshire early in January, 1876. I have in my own collection a very curious blackbird's egg taken near Liverpool in October, 1877. I may add that a colony of jackdaws near here commenced building in January, and on the 27th two nests contained eggs.—*H. H. Collinge, Leeds.*

THE CARBONIFEROUS LIMESTONE OF THE HALKYNS.

THE Carboniferous Limestones exposed in the Halkyn Mountain quarries deserve great attention from geologists, because some sections show the uppermost 70 feet of that formation, from which all the ordinary limestone fossils are met with mixed with others which serve as a connecting link with strata next in order. For example, small specimens of the bivalve Lingula are occasionally found at Halkyn; this is exceedingly rare in the Carboniferous Limestone. From the valley of the Dee the ground is a continual rise, culminating in the Halkyn mountain quarries; the succession of limestone beds from the valley to the hill-tops are amply shown by a number of quarries in every direction. The magnificent sections thus exposed, if placed in one vast cliff, would form an entire thickness of about 800 feet of limestone. The formation by violent upheaval of the Welsh hills is admirably illustrated in many of the sections, the contorted bands clearly demonstrating the violent forces which built up these mountains. Some parts will be found richly fossiliferous, others in which organic remains are scarce; splendid bands of encrinite marble are worked from beds lying immediately below the upper 70 feet (Abado beds). This encrinite marble occurs at the St. Patrick's Mine in three layers of perhaps two feet thickness; it is a hard limestone, crammed full of partially destroyed encrinite stems, and is capable of taking a high polish. The utter confusion of the headless encrinite stems proves how sudden and violent must have been the means of their destruction. It is curious to observe how great pieces of stone are here moved from one part of the quarry to the other by means of wooden rollers and levers, possibly in the same manner as the Egyptians brought their huge blocks, 2500 years ago, for the building of the Pyramids. Lead mines are frequent in the neighbourhood of Halkyn, from which many thousand tons of ore are annually raised. It occurs in large veins running either horizontally with the strata, or less frequently vertically. Many unsuccessful attempts have been made to reach the productive veins, consequently abandoned shafts are met with all over the hills. I would warn visitors against walking in the dark over these Halkyn hills; the result might easily prove fatal to a pedestrian.

The lowest bands of limestone contain no organic remains with the exception of foraminifera; they are as pure carbonate of lime as chalk, that is, something over 90 per cent. The Abado beds have little more than 50 per cent. of lime, the rest being made up of alumina and silica. It would be interesting to determine whether the intervening beds are purer carbonate of lime as they descend towards the lowest, and, granting it to be so, if the same rule holds good in other limestone districts. I have a sketch which gives a section representing the uppermost 70 feet of the Halkyn Mountains, locally known as the Abado beds. This section consists of hard bands of limestone from one to two feet in thickness with several layers of shales. The sketch shows the cliff as it stood in August last, but quarrying operations alter its face almost daily. It is chiefly from this quarry that Mr. G. W. Shrubsole, F.G.S., has obtained his splendid collection of the Fenestellidæ and other forms of Polyzoa, from which he gathered materials for his instructive paper on the reclassification of the genus Fenestella, published in a recent number of the Quarterly Journal of the Geological Society. I believe this is the first section which has been drawn of the Halkyn Mountain quarries, and it may be of value to indicate the exact bands in which natural to suppose that the destruction was caused by some sudden paroxysm of nature by means of which life was extinguished and form partially obliterated. The cliff there from the base to the uppermost ridge is 70 feet, consisting of hard and clearly-marked bands of hard limestone with occasional bands of laminated shales. At the bottom of the cliff, some few yards to the right of the ladder, will be found the first band containing Polyzoa, at a height of 5 feet from the ground. At this point the shale is 1 foot in thickness, it abounds in well-preserved specimens of Fenestellidæ. This is the only spot in which this band can be examined in situ, owing to a sudden dip in the strata; the band runs up at a great angle, decreasing in thickness, till it crops out at the edge of the cliff some 40 feet from the ground. Thirteen feet above the layer of shale comes a solid 2 feet of

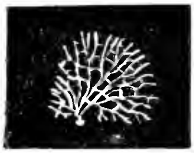


Fig. 86.—*Fenestella plebeia.*

Fig. 87.—*Fenestella plebeia.*

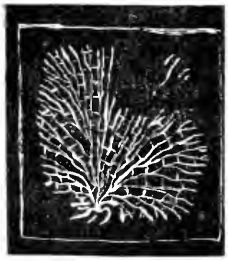


Fig. 88.—*Fenestella plebeia.*

Fig. 89.—*Glauconome bipinnata.*

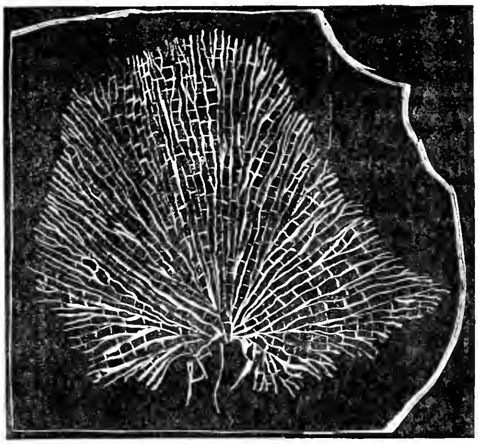


Fig. 90.—*Fenestella plebeia.*

the Fenestellidæ are met with. Five days have been given to obtaining accurate measurements, extracting the fossils in situ and tracing the various bands along the whole section. It is true the face of the cliff is subject to great alterations through blasting processes, but, judging from knowledge of the locality, it is probable that the bands of shale as now exposed in the Abado quarry will remain in much the same position as long as they continue to work the limestone in a direction similar to that now pursued. It is the Fenestellidæ for which the locality is so noted, but they are confined to three narrow bands; endless fossils are found of various kinds in Abado and neighbouring quarries, some well preserved, others much crushed and partially destroyed. I have heard the singular explanation of this given that it is due to the huge saurians or fishes which then lived, destroying as they lived. It would appear more limestone crammed full of badly preserved Polyzoa, extremely difficult to extract on account of the hardness of the rock, also from the fact of the cleavage not being in exactly the same direction as the stratification. Twelve feet higher will be found another 6 feet of well-marked bands divided by shales, in some of which it is probable there is a third zone of Fenestellidæ. Although it is impossible to examine this band it is certainly fossiliferous, this being proved by loose bits of shale which had fallen from the particular part of the rock, but we fail absolutely to identify the exact layer. From these two or three bands some of the most beautiful collections of Polyzoa have been recently formed, and are in better preservation than from any similar district in England. The dip of the upper 20 feet of the cliff is considerably less than that of the lower portions. The lowest band of shales will certainly yield the best fossils, but great patience is needed before anything like perfect specimens may be extracted. The shale lies in heaps outside the quarry, and the best pieces require to be dug out from underneath; these pieces are usually thoroughly wet, and need to be dried in the sun before being fit to work. In half-an-hour's time, however, they are ready for splitting with the thin end of a geological hammer, and each piece of shale will split into laminæ as thin as a shilling. Hundreds of Polyzoa will be found in these shales, Fenestella, Polypora, Glauconome, Palæocoryne, Gorgonia. It is also possible many new forms may be discovered in this locality, and in any case very perfect specimens of genera already known are certain to reward the careful searcher. A hand magnifying glass is absolutely necessary for the identification of many species.

Phillips and M'Coy have between them named twenty-six species of Fenestellidæ, which number Mr. G. W. Shrubsole has lately reduced to six absolutely defined species, to which several others may be afterwards added. Apparently the structure, growth, and habits of the Fenestellidæ have been imperfectly understood; thus young and full-grown specimens of the same species have been known under different names; also pore-faced specimens have been confounded with those showing the reverse side. It is unnecessary to discuss the characteristics of the Fenestellidæ and other Polyzoa of Halkyn Mountain, for Mr. Vine has recently entered very fully into the subject in this periodical, but it may be of service to give a tabular list of Mr. Shrubsole's species together with Phillips's and M'Coy's.

Mr. Shrubsole's Classification.

1. *Fenestella plebeia*, M'Coy	*Fenestella antiqua*, M'Coy. *F. carinata*, M'Coy. *F. flustriformis*, Phillips. *F. undulata*, Phillips. *F. irregularis*, Phillips. *F. formosa*, M'Coy. *F. tuberculo-carinata.*
2. *F. crassa*, M'Coy . . .	*F. laxa*, Phillips.
3. *F. polyporata*, Phillips .	*F. multiporata*, M'Coy.
4. *F. nodulosa*, Phillips . .	*F. frutex*, M'Coy. *F. bicellulata*, R. Eth. jun. *Actinostoma fenestratum*, Young.
5. *F. membranacea*, Phillips .	*F. tenuifolia*, Phillips. *F. hemisphæra*, M'Coy. *F. flabellata*, Phillips.

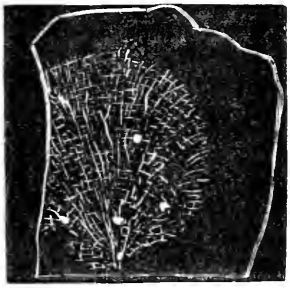


Fig. 91.—*Fenestella nodulosa.*

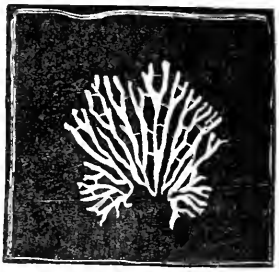


Fig. 92.—*Polypora polyporata.*

Fig. 93.—*Polypora polyporata.*

Here we find twenty species reduced to five, for which the thanks of geologists are due to Mr. Shrubsole. In these days there is a great tendency to create new species on insufficient grounds, and it must be aiding scientific knowledge if doubtful species are swept away. In different stages of growth the Fenestellidæ present very different appearances to the unaccustomed eye, and it is only by comparing thousands of specimens that their true relatives have been found. Pore-faced specimens of the Fenestella are extremely difficult to obtain. In splitting the shales, it is natural that the side of the organism presenting a smooth surface should be the easiest to develop, and so it proves in the case under consideration; the pore-faced specimens have little roughnesses on the surface which cause that side to adhere to the shale—hence good pieces are rare.

Taking the commonest form of Fenestella—*F. plebeia*—I figure it in various stages of growth. It will be remarked how, as the structure developes, it spreads out farther and farther, till the sides meet in the full-grown creature immediately below the root. The interstices and dissepiments also thicken as the Fenestella grows older. It should be noted that none of these are from pore-faced specimens, and that the drawings are of the natural size. Fig. 91 is *Fenestella nodulosa*, which is a more delicate species than *plebeia*, and has small nodules on the interstices.

Polypora polyporata (fig. 92) has a much coarser form; many fine specimens are found at Halkyn. Fig. 89 represents the beautiful *Glauconome bipinnata*, a form of Polyzoa which has not yet been thoroughly described.

Mr. Vine has fully explained the structure of most of these Polyzoa, and Mr. Shrubsole has reclassified them: in this article I wish to point out one of the best localities for the collector to search, also to explain the best manner to extricate the very brittle forms from the rock in anything like good condition.

C. Parkinson.

Trichinæ.—Having read that it is believed pigs get trichinæ from rats, I should like to know how this comes to pass.—*M. E., Upton House.*

A WEEK IN CORNWALL.

By WALTER G. WOOLLCOMBE, B.A., F.L.S., &c.

IN a gorge, washed out of a steep precipice on the left-hand side of a picturesque fishing-cove* on the North Coast of Cornwall, grows the most beautiful of our indigenous ferns, the true Maiden-hair (*Adiantum Capillus-Veneris*). Its roots are adpressed to the laminæ of the shaly rock, which is kept moistened by the droppings of a spring from above, and its delicate fronds, overhanging the natural ledges, afford a rich contrast to the dark colour of the stone.

A very narrow and steep path leads up to a shallow foot-hold on a projecting ledge, whence we may procure some very young specimens, but, if venturesome enough to climb still further over the slippery and treacherous rock, we may be rewarded by obtaining with the help of a stick some of the more luxuriant plants.

At present this fern is fairly abundant in this locality, but, now that the natives have discovered that "their vairn," as they call it, is valued by people in the neighbourhood and by passing tourists, I fear that their greed of money and the wanton destruction of the youngest plants would lead to its total extermination if, as is fortunately the case, the largest specimens were not for the present entirely out of reach.

There are only two other places on this coast where the Maiden-hair is known to grow, both of which are so precipitous that it is impossible to get any specimens of the fern without the help of a man and a rope.

Leaving this cove and walking in a north-westerly direction up the steep hill through the village, which, by the bye, is well known by connoisseurs for the old china its inhabitants possess, we soon reach the top of the cliffs and gaze on as magnificent a view of coast scenery as can be seen anywhere. Before us Tintagel Castle, "the rude remains of high antiquity," stands boldly out, and to the north-west of Hartland Point, in the far distance, Lundy Isle rises as a giant from the sea.

A few minutes' walk along the cliffs, which are covered with the red, purple, and yellow flowers of *Anthyllis vulnerata* (Lady's fingers), brings us to another small fishing cove which boasts of an "hotel," affording excellent accommodation for tourists.

A short distance up the lane leading from this cove can be obtained very large plants of *Blechnum Spicant*, *Scolopendrium vulgare*, *Polypodium vulgare*, *Aspidium Filix-mas*, *Asplenium Filix-fœmina*, *Aspidium spinulosum*, and *Aspidium aculeatum*, all of which are very common in this and the adjoining county.

Leaving the sea, and taking a short cut across the fields, we come to a valley, through which a stream flows, and on its banks grow in profusion *Epilobium hirsutum*, *Lythrum Salicaria*, *Inula dysenterica*, *Osmunda regalis* (whose local name is the Crown Ash-fern), *Apium nodiflorum*, *Apium graveolens* (Wild Celery), *Cochlearia officinalis*, *Samolus Valerandi*, and a host of other common plants. Near the mouth of this stream the caves are covered with the *Asplenium marinum*, a common fern all along this coast, but generally difficult to reach.

Walking along the cliffs, where grow *Scilla autumnalis* and *Cuscuta Epithymum*, with its many flowers parasitic on the gorse, we come to a small zigzag path leading to a cave in the cliff whose roof is formed of large boulders of pyrites in which there are numerous lodes or veins of antimonite, silver-lead and other minerals, offering a fair promise of reward to any energetic capitalist. In a cornfield near here grow in great abundance *Chrysanthemum segetum*, *Antirrhinum Orontium*, *Centaurea cyanus*, *Lycopsis arvensis*, *Lychnis Githago* and *Borago officinalis*. Half an hour's walk brings us to Tintagel Castle. "On the summit of a towering precipice," writes Gilbert, "which starts out in bold sublimity amidst the waters of the Northern Ocean, stand the venerable ruins of Tintagel Castle. The only passage now to the island is by way of a narrow path, which is carried over most hideous cliffs on the western side." At the end of the path we can enter through an oak door placed there by the present rector of the village, who is *ex-officio* the "Lord of Tintagel Castle," one of the most ancient sinecures in Britain.

The arch of the door is in a tolerable state of preservation, as also are the embattled walls. On the right of the gate are the remains of two small rooms, which were probably occupied by the porter or guard. Walls within the area are to be traced in every direction, even to the edge of the cliff. On the highest part of the north of the island are the remains of a chapel, dedicated originally to St. Uliane, and in which there is an ancient slab supported on rocks which probably served as an altar.

King Arthur was born at Tintagel Castle, A.D. 500, he was the son of Uter, a British chieftain, and Igerna the wife of Gothloris, a duke of the county. On the rocks near here grow *Statice auriculifolia*, *Silene inflata*, var. *maritima*, *Matricaria inodora*, var. *maritima*, *Crithmum maritimum*, and *Spergularia rubra*. Between Tintagel and Boscastle there is a small stream whose banks are covered for about fifty yards with *Mimulus luteus*. This lovely plant with its golden flowers is not indigenous, but, having so well established itself in many parts, it has become completely naturalised. Soon we reach Boscastle, where

* For obvious reasons I have not specialised fully the habitat of the maiden-hair; but if any botanist is desirous of obtaining a British specimen of this fern, and of seeing it in its native haunts, I will gladly give him full information. Any help I can give to Mr. G. T. Harris, whose note in SCIENCE-GOSSIP for September is well called for, will be forthcoming.

Inula crithmoides, the golden samphire, is common on the cliffs. The little harbour of Boscastle is formed by a deep romantic chasm into which, through a narrow opening, the sea forces its passage and with a dead hollow sound struggles among the adjoining rocks and caverns. At the base of the cliffs the sea has worn several large passages which in some places penetrate at least half a mile into the bowels of the earth. Into these subterraneous caverns boats manned and armed frequently enter, by help of lights, in search of the seals which make these their homes. Near here the Sea Holly (*Eryngium maritimum*) grows on the sandy shore, whose roots are made into a sweetmeat called "candied Eryngo root."

Let us now leave the sea and take the road leading to the large slate-quarry at De la Bole. In the hedges along the roads we find *Centranthus ruber* (Red Valerian), *Fœniculum vulgare*, *Artemisia vulgaris*, *Tamarix Gallica*, *Reseda luteola*, *Reseda lutea*, *Serratula tinctoria*, *Salvia verbenaca*, *Verbena officinalis*, *Achillea Ptarmica*, *Inula Conyza*, *Ononis arvensis* and *Verbascum Thapsus*. Crossing two fields we enter a small lane, by the side of which grow in large quantities, *Asplenium Adiantum-nigrum*, *Asplenium Ruta-muraria*, *Asplenium Trichomanes*, the false Maiden-hair, as well as *Ceterach officinarum*, and *Asplenium lanceolatum*. Near here I found pure white specimens of *Digitalis purpurea*, *Ononis arvensis*, and *Stachys Betonica* growing within a short distance of each other. *Chrysanthemum Parthenium* and *Epilobum hirsutum* are common all along this lane. Soon we arrive at De la Bole, and turning to the left we enter the well-known slate quarry, from which the best slate in England is obtained. It is supposed to belong to the Devonian period, and the statement at the end of last year that a fossil bird had been found in the slate was challenged successfully. This quarry has been worked for over a hundred and fifty years, and is more than five hundred yards long and two hundred broad. The deepest part is over sixty fathoms. The strata of the slate lie in the rock, which is at first in a loose shattered state with laminæ of unequal thickness, dipping to the S.W. This continues to the depth of twelve fathoms of useless stuff. Then come ten fathoms of firmer brown stone, called "top-stone," used for pavements.

It now mends in quality, reaching the best about thirty fathoms from the surface. This good slate is of a greyish-blue colour, and of such close texture that it sounds like metal when struck. The masses are raised from the bottom in trucks, running on an inclined railroad and drawn up by a stout rope wound round the bobbin of a machine, about four feet in diameter.

Not far from De la Bole is a silver-lead mine, which has remained for some time unworked or "scat." It is well worth a visit from the mineralogist, as within a very small distance fine specimens of iron, copper, silver-lead, three kinds of mundic, and various kinds of "spar" may be found. Beautiful specimens of quartz are found here crystallised in various forms, the most usual of which is that of a hexagonal prism surmounted with hexangular pyramids. The most pellucid of these are called "Cornish diamonds," and are considered superior to every diaphanous crystallisation in Great Britain. They are generally found in small conclaves in the midst of the metal lodes. The clearer they are, the better do they cut glass.

Not far from here are two very large lodes of the best antimonite, up till now unworked, but soon to be taken in hand by a company.

The distress in Cornwall in consequence of the closing of many of the mines has been very great, but there is every prospect now of a revival of the trade, which will stop the constant emigration of the working classes from the county and refill the numbers of cottages at present unoccupied.

In conclusion, I will just mention the more important minerals that have been or are found in Cornwall:

Gold has been found among the stream tin, and is always considered the perquisite of the miners, who collect the grains in quills for sale.

Silver is obtained from the silver-lead at the rate of 140 oz. of silver from 1 ton of lead; also found native.

Copper and *iron* in all forms and the historic *tin* are of course the staple products; native *bismuth* in small quantities, and *cobaltine*, *wolfram*, *molybdenite* and *uranite* also have been found here; *titanium* from a mineral called *menachante*; *zinc* from blende; three kinds of *mundic*, called from their colours silver, brass and brown mundic, the first being of hardly any commercial value, but prized for its very pretty crystals; and *grey antimony* in large quantities and in a very pure state completes the list.

The College, Brighton.

LIST OF ASSISTING NATURALISTS.

Middlesex.

London.—Henry Hillman, Prest. North Middlesex Nat. Hist. Assoc., 26 Ingleby Road, Holloway, N., and 456 King's Road, Chelsea, S.W. *General Zoology.*

Lancashire.

Fylde District.—James T. Lightwood, Pembroke House School, Lytham. *Conchology.*

Folk-lore, County Tyrone.—The country people consider wheat is better sown in the dark of the moon as a preventive against smut. Animals mated at that time are prolific to a certainty. If frogs spawn near the edge of pools, this is considered to be a proof that the summer is to be a wet one but if in the middle, a dry season.—*S. A. Brenan.*

NOTES ON THE NATURAL HISTORY OF JERSEY.

By Edward Lovett.

[*Continued from page 77.*]

Crustacea.

The podophthalma or stalk-eyed crustacea are remarkably well represented in Jersey, where the favourable circumstances that are so conducive to the marine life already referred to, are perhaps even more so to this group of animals. Its shores present favourable localities, not only to those species whose habits lead them to frequent rocky sheltered bays and boulder-strewn beaches, but also to those that affect sandy reefs or mud and clay banks. In order to enable the student to identify the species, and recognise the localities whence those species may be obtained, it is our intention to enumerate, in the arrangement followed by M. Milne-Edwards, those that we have obtained or know to have been obtained from the shores, as well as from the immediate neighbourhood of Jersey, giving a very brief outline description of each, together with its favourable haunts, as well as the mode of obtaining it.

Although dredging is a favourable method of obtaining these animals, and in fact the only method for very deep water species, still the best results as regards number of species are often obtained by searching the rocks and pools left by the receding tide; those farthest from the shore being usually the most prolific in specimens.

In this way a fairly good collection can soon be made, and the interest attached to working in this manner is greatly increased by the vast number of other animals that are to be met with, and from whose habits and mode of existence so much may be learned and so much pleasure derived.

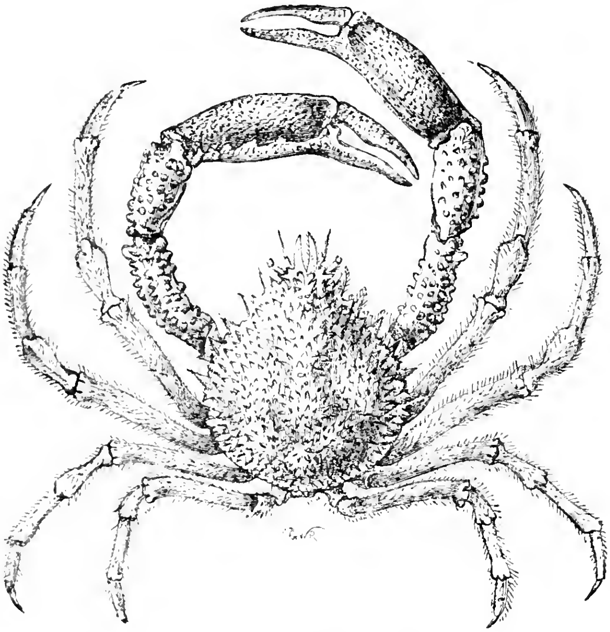


Fig. 94.—Spiny Spider-crab (*Maia squinado*).

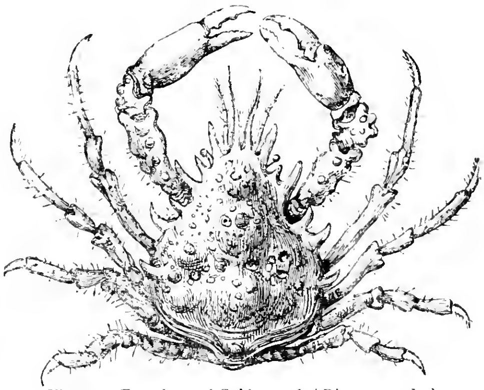


Fig 97.—Four-horned Spider-crab (*Pisa tetraodon*).

Fig. 95.—*Pirimela denticulata.*

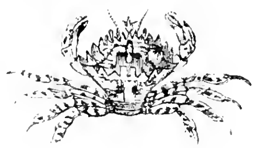


Fig. 96.—*Euryonome aspera*, female.

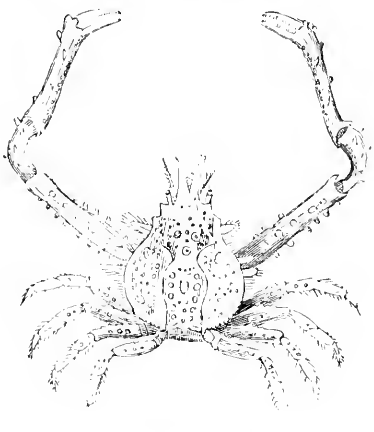


Fig. 98.—*Euryonome aspera*, male.

Brachyura.

Stenorynchus rostratus. Carapace roughly triangular, small, pale reddish-brown; legs long and slender; rostrum short; antennæ, basal joint without spines. Frequents weeds and stony ground in moderately deep water. Obtained by dredging, or may be found at exceptionally low tides.

Stenorynchus longirostris. Carapace and legs as above; rostrum long and slender, curved upwards; basal joint of antennæ armed with two spines. Localities as above, but in deeper water.

Achæus Cranchii. Carapace barely half an inch in length, triangular, hairy; legs slender and hairy; rostrum stunted. Frequents deep water, and is often covered with bits of fucus. Obtained by dredging.

Inachus Dorsettensis. Carapace like *stenorynchus*, but broader and more robust; legs long and tapering; rostrum stunted and notched: colour pinkish-brown. Frequents various depths, and lives amongst weed and stones. Obtained by dredging.

Inachus dorynchus. Carapace less rounded than former, armed with two spines instead of four on the cephalo-thoracic region; colour brighter, being often of a coral pink. Locality similar to that of *I. Dorsettensis*.

Pisa tetraodon. Carapace robust, over an inch in length, nearly the same in width; legs short with claws hooked; rostrum bifid; colour varying from brown to red. May be found under stones at low water.

Pisa Gibbsii. Carapace as *P. tetraodon*, but covered with densely packed hairs, often affording anchorage for sponge, zoophytes, &c. Inhabits deeper water than former species, and is rare.

Hyas coarctatus. Carapace triangular, but anterior portion contracted; legs slender; rostrum short; colour often bright pink or yellowish-red. Obtained by the dredges of the oyster boats.

Maia squinado. Carapace roughly circular, large and very spiny; legs tapering, first pair not massive. Colour reddish-brown. Frequents nearly all parts of the coast, and is largely captured for food, chiefly in pots.

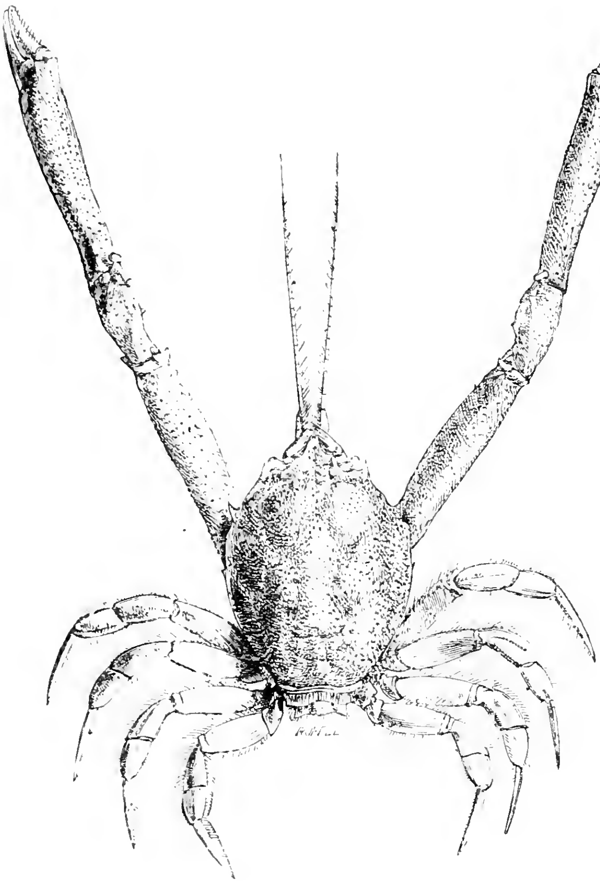


Fig. 99.—Masked Crab (*Corystes cassivelanus*), male.

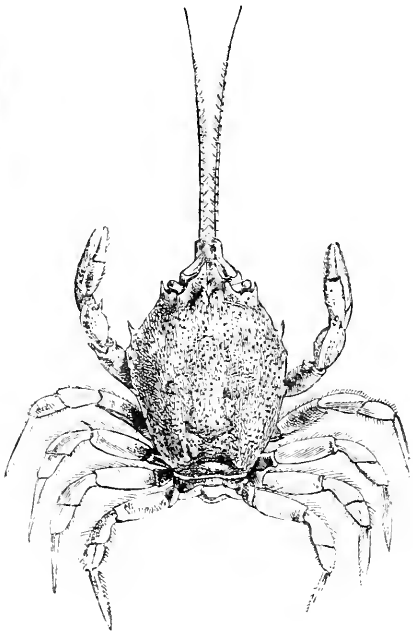


Fig. 100.—Masked Crab (*Corystes cassivelanus*), female.

Euryonome aspera. Carapace seldom over an inch in length; spiny and tuberculated, as also are the legs, the first pair of which are very long. Colour pinkish-brown. Has been obtained by dredging in deep water towards Guernsey.

Xantho florida. Carapace about two inches broad, massive, rough when young; of a rich reddish-brown tint. Legs powerful, especially first pair, smooth. Lives under stones and in crevices, can be obtained at low water by turning over boulders. Has a tendency to throw off its limbs if killed in spirit.

Xantho rivulosa. As last, with the exceptions that the carapace is more flat and that the colour instead of being reddish-brown is variable, being often yellowish red marked with pink freckles. Rare under stones, at extreme low tide, about La Rocque.

Cancer pagurus. The edible crab. Description needless. Common on rocky shores and largely captured for food. Owing to the relentless way in which *very small* specimens are taken and exposed for sale in immense heaps in the market, this article of food bids fair to become scarce, if the practice be not discontinued.

Pilumnus hirtellus. Carapace about an inch broad, rounded, and clothed with slight setæ. Colour rich reddish-brown; first pair of legs massive. Frequents hollows under weedy stones in pools; may be searched for at low tide on rocky shores.

Pirimela denticulata. Carapace small, convex and serrated forward. Colour greenish-brown; legs like

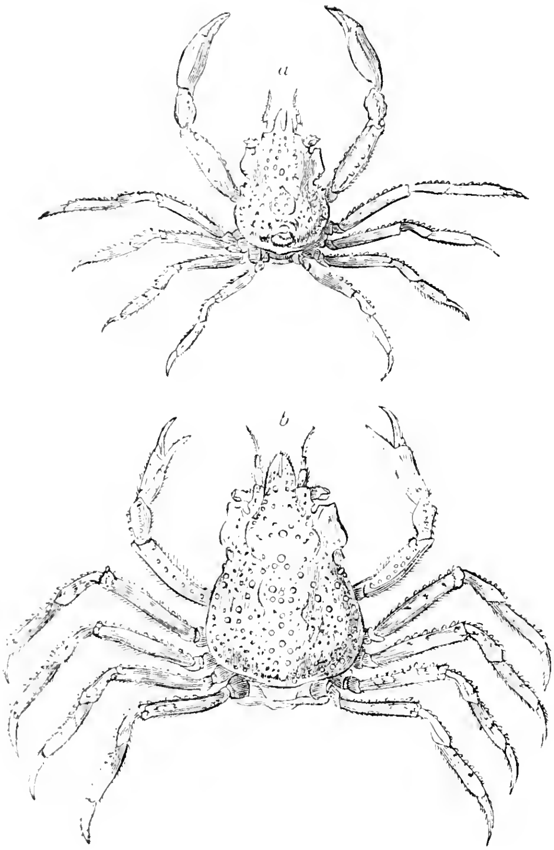


Fig. 101.—*Hyas coarctatus.* *a*, male; *b*, female.

those of shore crab. Is found amongst fucus, but is very rare.

Carcinus mænas. The common shore crab. Description needless. Frequents sandy bays and zostera pools, where it often may be found of beautiful colours, rich green with pearly markings.

Portumnus latipes. Carapace small, delicate and of a whitish-brown tint, mottled; legs slender. This rare species lives in sand banks, and its exuviated carapace is more frequently met with than the animal itself. These exuviæ may be found at St. Ouen's Bay.

(*To be continued.*)

ORNITHOLOGY OF THE POETS.

IN the following paper I shall only attempt to give a few of the most pleasing passages on birds and their habits, from the poets. Birds are essentially the creatures of poetry, almost as much so as flowers; the purity and joyfulness of their existence, the grace and sprightliness of all their actions, those wild and solitary spots which they so love to frequent—the lonely heath and the green forest—all combine to make them the prime favourites of the true poet. Perhaps nobody has ever excelled Shakespeare in the accuracy and careful word-painting with which he describes Nature in her various aspects, although there is wanting in his poetry that great love of Nature for her own sake which we find in the poets of a later period, pre-eminently in the "Lake School" of poets, such as Wordsworth or Coleridge. In Macbeth's solemn invocation to night the whole passage is wonderfully heightened by the last two lines:

"Come, seeling night!
Scarf up the eye of pitiful day;
And with thy bloody and invisible hand
Cancel and tear to pieces that great bond
Which keeps me pale! *Light thickens*
And the crow makes wing to the rooky wood."

It is well known that the crow (*Corvus corone*) is the last bird to retire to rest, with the exception, perhaps, of the redbreast (*Silvia rubecula*). In 'Macbeth,' too, we have the following passage:

"This guest of summer,
The temple-haunting *martlet*, does approve,
By his lov'd masonry, that heaven's breath
Smells wooingly here. No jutting frieze,
Buttress, nor coigne of vantage, but the bird
Hath made his pendent nest and procreant cradle;
Where they most breed, I have observed
The air is delicate."

But the bird does not always show its love for the pure and untainted air, as I have seen it nesting as late as October in the very heart of Dublin; and a writer on our migratory birds mentions having seen it nesting in the Borough and the Strand itself. The 'Midsummer Night's Dream' has some beautiful descriptions of Nature; the blackbird is spoken of as:

"The *ousel cock* so black of hue
With orange tawny bill.
. . . .
The finch, the sparrow and the lark,
The plain song *cuckoo* gray,
Whose note full many a man doth mark,
And dares not answer nay."

Logan has written a beautiful poem to the cuckoo, beginning:

"Hail, beauteous stranger of the grove!
Thou messenger of Spring!
Now heaven repairs thy rural haunts,
And woods thy welcome sing."

Almost everybody knows Wordsworth's beautiful poem on the cuckoo; its note, he says, comes upon us as:

> "A sudden thrill, a joyous thought,
> A feeling many a day forgot."

The power of association is quite inexplicable; strange that the monotonous note of the cuckoo should so often lead us back again as it were to the "haunted chambers of youth!"

"Most musical, most melancholy," writes Milton of the nightingale (*Silvia nocturna*); but Coleridge says:

> "A melancholy bird? Oh, idle thought!
> In Nature there is nothing melancholy."

And he goes on to describe the bird's song:

> "They answer and provoke each other's song
> With skirmishes and capricious passagings,
> And murmurs musical and swift jug, jug,
> And one low piping sound more sweet than all."

Drummond of Hawthornden (1620) says:

> "Thou thy Creator's goodness doth declare.
> . . . .
> What soul can be so sick, which by thy songs
> (Altered in sweetness) sweetly is not driven
> Quite to forget Earth's turmoils, spites and wrongs,
> And lift a reverend eye and thought to Heaven?"

Mrs. Hemans, Mrs. C. Smith, Hurdis, Cowper, and Thomson have all written of the nightingale, and Landor, in his "Imaginary Conversations," says to Southey, "The woodlark and the nightingale and the ring-dove have made me idle for many an hour when I have gone into the fields to collect fresh materials for my composition." We should hardly expect to find many pleasing descriptions of Nature in the artificial school of Pope, but still, in his "Essay on Man," we have the following lines on the pheasant (*Phasianus Colchicus*):

> "See! from the brake the whirring pheasant springs,
> And mounts exultant on triumphant wings:
> Short is his joy; he feels the fiery wound,
> Flutters in blood, and panting beats the ground;
> Ah! what avail his glossy varying dyes,
> His purple crest and scarlet-circled eyes;
> The vivid green his shining plumes unfold,
> His painted wings and breast that flames with gold."

Elsewhere the pheasant is spoken of as:

> "The gaudy pheasant rich with varying dyes."

and R. Bloomfield says:

> "The bold cock-pheasant stalked along the road,
> Whose gold and purple tints alternate glow'd."

In the "Essay on Man" we have the following lines:

> "Admires the jay, the insect's gilded wings?
> Or hears the hawk when Philomela sings?"

I suppose Pope meant by the insect with gilded wing a butterfly; I do not know whether the jay (*Garrulus glandarius*) ever preys on butterflies, but I have seen "the spotted flycatcher" (*Muscicapa grisola*) fly at and attempt to capture the "large white butterfly" (*Pieris brassicæ*).

The jay is spoken of by Cowper with some favour in the following lines from "The Sofa":

> "The jay, the pie, and ev'n the boding owl
> That hails the rising moon, have charms for me."

There is a remarkable coincidence in Thomson's "Spring":

> "The jay, the rook, the daw,
> And each harsh pipe, discordant heard alone,
> Aid the full concert."

The jay is again mentioned in Hurdis' "The Village Curate":

> "Hark! how the cuckoo mocks the Sabbath bells,
> The jay attends, a very termagant."

Certainly a very good name for the jay!

I find the water-ouzel (*Cinclus aquaticus*) twice mentioned, and the ring-ouzel (*Turdus torquatus*) once; of the dipper, Carrington says:

> "The bird
> Is here,—the *solitary* bird that makes
> The rock his sole companion."

But another writer says:

> "The *cheerful* bird that loves the stream,
> And the stream's voice, and answers, in like strains
> Murmuring deliciously."

Its song is said, indeed, to have a great resemblance to the gurgling sound of water. I find the bird is called in Cumberland "the Bessy Ducker," and it begins to sing as early as January.

We find the redbreast (*Silvia rubecula*), the wren (*Silvia troglodytes*), the turtle- and ring-doves (*Columba turtur* and *Columba paltumbus*) frequently mentioned in the poets. The passage on the ring-ouzel (*Turdus torquatus*) is from Bidlake's "Nesting of Birds":

> "The ouzel, lone frequenter of the groves
> Of fragrant pines, in solemn depth of shade finds rest."

The bird frequents for breeding the wild mountainous hills of Scotland; it also nests in Yorkshire and Derbyshire. Gilbert White frequently saw them in Hampshire during their migration to their breeding-grounds. Grahame speaks beautifully of the ring-dove's note:

> "How peaceful every sound! the ring-dove's plaint
> Moaned from the twilight centre of the grove,
> While every other woodland lay is mute
> Save when the wren flits from her down-coved nest,
> And from the root-sprig trills her ditty clear."

The following exquisite lines on the robin are from Thomson's "Seasons":

> "Half afraid, he first
> Against the window beats! then brisk alights
> On the warm hearth; then, hopping o'er the floor
> Eyes all the family askance,
> And pecks, and starts and wonders where he is."

The turtle-dove, as the nightingale, is invariably spoken of as mournful; the owl as the "*boding* owl," or some other similar epithet is applied to it:

> "It was the *owl that shriek'd*, the fatal bellman,
> Which gives the stern'st good-night."
> —'Macbeth,' iv. 2.

> "The blast blew cold, the dark *owl scream'd*
> Her lover's funeral song."
> —*Mallet.*

> "Yet have I heard . . . .
> The *prowling owl*
> Sweep by, and with a hideous shriek awake
> The churchyard echo."

Blair, in his "Grave," closely imitating the language of Shakespeare, says:

> "Again! the *screech owl shrieks:* ungracious sound!
> I'll hear no more; it makes one's blood run cold."

Keats, in his "St. Agnes' Eve," has the line:

> "The owl for all his feathers was a-cold."

Parnell speaks of the "*croaking din*" of the *raven*, and Beattie, in his poem "The Minstrel." The word "croaking" is frequently applied to the raven by poets; in fact the epithets boding, screeching, or moping, croaking, meek or mournful, and gaudy or painted seem to be almost indispensable when mention is made of the owl, raven (*Corvus corax*), dove, and pheasant. In the same way the epithet "limping" or "fearful" is nearly always applied to the hare (*Lepus timidus*):

> "The hare *limped trembling* through the frozen grass."
> —*Keats.*

> "In the long grass they *skulk, or shrinking* creep."
> —*Somerville.*

Thomson has the line:

> "The hare *limps* awkward;"

and he applies, too, the epithet "timid" to the same animal. The following lines on the nightjar (*Caprimulgus Europæus*) are by Mary Roberts:

> "Oh, lover of the twilight, hail!
> Say to what deep and pathless vale,
> 'Mid forest dark of aged oak
> Ne'er echoing with the woodman's stroke,
> Where Nature seems to sit alone,
> Majestic on a craggy throne,
> And nibbling flocks and herds are seen
> To wander 'mid the pathless scene,
> Dost thou on rapid pinions haste
> When summer's gladsome months are past?"

These are very fine lines; it is easier to imagine this strange, weird bird, with its almost unearthly note, inhabiting some deep, pathless wood than the bright cheery coppices and woods of the south of England; it has always seemed to me to partake of the nature of the owl, the swallow, and the cuckoo. Anatomists say it much resembles the latter bird; in its mode of pursuing its prey it resembles the swallow, and it is similar to the owl in its nocturnal habits. I took its two white elongated eggs, splashed with cinereous grey, in North Hants in June 1878; they always lay their eggs, according to my observation, in underwood of about two or three years' growth. The young are occasionally fed during the day. Gilbert White, in his exquisite poem, has the following accurate lines:

> "While o'er the cliff th' awakened churn-owl hung
> Through the still gloom protracts his chattering song;
> While high in air, and poised upon his wings,
> Unseen the soft enamoured woodlark sings."

Thomson, in his "Spring," speaks of the sweet song of the woodlark (*Alauda arborea*), and Ben Jonson, in the "Grove," speaks of the "crested lark," which I take to be the woodlark. William Browne, in his "Pastorals," has the lines:

> "The mounting lark (daie's herald) got on wing,
> Bidding each bird chuse out his bough and sing."

I think the woodlark is probably meant, as he is enumerating the birds of the *grove*. Poems and passages in poetry on the skylark, blackbird, and song-thrush are very numerous. Some of the most beautiful poems on the skylark are Hogg's poem: "To the Skylark," Shelley's "Skylark," and Wordsworth's well-known verses. Other birds of the lark or bunting kind are rarely mentioned; of the yellow-hammer (*Emberiza citrinella*), an anonymous writer says:

> "And from the bank
> The yellowhammer flutters in short fears
> From off its nest hid in the grasses rank,
> And drops again when no more noise it hears."

It is not very happily expressed, but wonderfully true to the bird's habits. On the corn-crake or daker hen (*Rallus crex*), I know of but two passages: one is by Dr. Leyden, describing the unhappy fate of the poor bird:

> "Again the ruthless weapon sweeps the ground,
> And the grey corn-crake trembles at the sound;
> Her callow brood around her cowering cling,—
> She braved its edge—she mourns her severed wing."

The other is by Clare, the Northampton peasant; it is expressed with the poor fellow's usual simplicity and accuracy. Many other passages on different birds crowd on the memory, but I have already tried my readers' patience too much. I shall end with the following passage from Longfellow:

> "Even those migratory bands,
> The minor poets of the air—
> The plover, peep, and sanderling,
> That hardly can be said to sing,
> But pipe along the barren sands;
> All these have souls akin to ours."

GEORGE DEWAR.

MICROSCOPY.

CUTTING SECTIONS OF COAL.—In reply to Mr. W. Dalton Smith's query in the May number of SCIENCE-GOSSIP, I have found the following method of making coal-sections to be easy and successful. It should be stated, however, that I have only tried that particular kind of coal mentioned by Huxley as containing macrospores and microspores in such abundance, viz. the Better-Bed coal of Bradford and district. Having selected a chip of coal, grind it down to a smooth surface on an ordinary school-slate. Then cement it to a glass slide, either with shellac or Canada balsam; the former is perhaps the easier of manipulation. If balsam is used, it must be evaporated until it is of such hardness that a dent can only just be made in it by pressure with the thumb-nail, then remelt it and fix the smooth surface of the coal to the slide. The coal may then be ground on the slate to such a thinness as to show the spores. The coal-matrix containing the spores, cannot, as far as I am aware, be ground sufficiently thin to be transparent, and if it could be so ground, it is doubtful whether there would be any organic structure perceivable. Some of the loose friable matter between the laminæ of ordinary house-coal I once prepared by steeping for some days in liquor potassæ, and then mounting in balsam. In a few weeks, the additional transparency acquired from the balsam, rendered coniferous structure observable here and there on the slide. It was too friable to cut or grind, so I merely took the thinnest bit I could get. I do not know whether the liquor potassæ had any action on it or not.—*C. L. Lord.*

Sections of Coal.—In your April number of Science-Gossip there appears an article by F. Kitton giving his experience on coal, and asking for the experience of others who may have tried the same. I cannot say that I have waited over a year for the coal to soften, but I have some very fine specimens of coal sections, showing distinctly the woody tissue, dotted ducts, scalariform vessels of ferns, and one slide showing sporangia. Now I take it for granted that those who wish to make sections of coal for microscopical examination, wish to show the vegetable origin of coal, so I will relate my experience. I find among the soft coal that is used in this state, i.e. Iowa coal, some hard heads, so called (that is, hard lumps of coal in various stages of transition from good coal to charcoal), and well-preserved wood mixed with sulphide of iron. I break up these lumps and cut out with a chisel the wood from the coal, which is in every respect (for our purpose) the same as the coal without the bitumen; now by breaking this in the proper direction I am able to get sections both ways of the tissue, and when ground down thin make a good transparent object, or opaque by shutting off the light from the mirror, and using the condenser, when the sulphide of iron glistens like gold dust among the woody tissue. Such is my experience, and I think the best way to obtain good specimens of woody tissue from coal; but I hope that some others of your readers will kindly state their experience as Mr. F. Kitton suggests, and if this is new to, or will help any of your readers I shall be glad that I have contributed my mite.—*John Walker, South Minneapolis, Minnesota, U. S. A.*

Cutting Sections of Coal.—In the April No. of "Science-Gossip," Mr. F. Kitton calls attention to the directions given in the "Micrographic Dictionary" and other works, for the cutting of thin sections of coal. During the years 1878-9, I many times tried to cut a section, and like your correspondent, all my attempts ended in failure. I have soaked pieces of coal in a strong solution of bicarbonate of potash, and on examining them at the expiration of a fortnight I found no change. I replaced them in the solution and kept them covered for several months, and although I examined them at frequent intervals, I never could obtain a section, in fact they were as hard as when they were first placed in the solution. On one occasion I boiled some pieces of coal in the solution for a couple of hours, and when I attempted to cut it, I found the coal was a little softer on the surface, but too brittle to obtain a section.—*J. Wilson.*

Sections of Coal.—After many years' experience the results obtained with ordinary marketable coal of Great Britain (cannel coal excepted) are not sufficiently good to repay the time occupied in their production. Having been intimately connected with the production of coal, I have endeavoured to gain all the information I possibly could respecting its structure and mode of formation from sections of my own preparing, knowing full well that any fossil wood with indistinct structure is passed off as coal by dealers to the unwary. I have tried repeatedly to get a good slide of ordinary coal, and the outcome of all my labour is one section only that shows any structure, and this was cut from a piece of ordinary marketable coal raised at Illinois, U.S.A., and is a good example of both formation of coal and preservation of structure of the wood composing same. The method I adopted in procuring this section was as follows. I cut a piece about a quarter of an inch in thickness with a fret saw, placed it in pure turpentine for some considerable time, then in dilute Canada balsam, allowing the coal to remain in this until I thought it was saturated. I then allowed the turpentine to evaporate, and by a gentle application of heat gradually hardened the balsam the section had absorbed. One side was then ground flat, polished and cemented to the slide the section was to occupy; when completed the other side was a simple repetition of careful grinding on a water of Ayr-stone, just as an ordinary rock section would be treated, only with more care when the critical point was approached. I honestly believe chemicals and razors the greatest fallacies for doing the work I have described, and it is a great pity new editions of good works are disfigured with such errors.—*W. H. Harris, Plymouth.*

Cutting Sections of Coal.—I am greatly amused at the discussion which has arisen in your columns anent the cutting of coal sections. I suspect your correspondents have been experimenting with the refractory anthracite coal too common in our coal scuttles; but this being nearly all mineral matter, of course, does not yield to the action of the potash. Neither would it show much if so cut; they remind me of a former sapient microscope pupil of mine, who took to himself much credit for soaking a nail from the "Victory," in the hope of making a section of it for the microscope to show the structure. The coal for which this process is recommended, and which yields the best objects, is that which is more of a lignite character, and when so treated and digested with heat, is cut readily. To my own knowledge Professor Henfrey cut hundreds of sections in this manner.—*Chas. H. Griffith.*

STUDIES IN MICROSCOPICAL SCIENCE.—We doubt whether any department of natural science is exhibiting so much diligence as microscopy. This is evidenced by the increasing current of microscopical literature. Mr. Arthur C. Cole, F.R.M.S., has commenced contributions from his own extensive stock of practical knowledge under the above title. The first two parts are beautifully got up, the coloured illustrations being exquisite. We wish the new venture hearty success.

ON THE CONTINUOUS OBSERVATIONS OF MINUTE ANIMALCULA. — Having found some difficulty in keeping minute living objects under observation on account of the water evaporating, and also that any attempt at a supply produced currents which washed away all very small organisms, I was led to try a different proceeding. I put upon a slide a small quantity of water, and a very minute portion of plant, not using enough water to occupy all the space under the cover glass, but leaving part of it occupied by air. I then melted some paraffin wax, and put a ring round cover on turntable, thus sealing up the contents. I have inside a variety of minute beings, embracing two species of rotifers, several other species of animalcula, and living diatoms, several hundred in all, and at the expiration of a week they are still alive and active. I then tried the same process on *Cyclops quadricornis*, only I made a shallow cell to contain a depth of water just enough not to squeeze the creature betwixt slip and cover. I sealed this up air-tight with wax, and have had the young cyclops hatch out of the eggs in each instance some dozens in number, and very active. Of course, in this instance also, I only use a small drop of water, the rest of cell is filled with air which is in contact with the water all round. The cyclops, old and young, are doing well at the end of forty-eight hours. Obviously if one finds a rare minute creature, and wishes to send it to a friend for inspection, one may seal it up in this way without the risk, or it may be, certainty of losing it involved in placing it in a tube. It will live comfortably enough during transmission by post, or during the few hours required to carry it to the meeting of a society, or a friend's house. It is even safer in transmission, because the quantity of water used is not enough to shake about as it will in tubes or small bottles, and half a day's fishing to find it again is dispensed with, as it is sure to be on the slide.—*Edwin Holmes*, 149 *Essex Road, Islington.*

STELLATE HAIRS OF DEUTZIA.—Some one was asking how to prepare these. The Rev. Adam Clark Smith, of Crowborough, told me he always scraped them off with a sharp knife. I therefore tried it. Scrape the leaf carefully, and transfer to slide with camel-hair pencil. The scraping is not always necessary. I would suggest some kind of a washing first.—*John Alex. Ollard, F.R.M.S., Enfield.*

ZOOLOGY.

STEPHANOPS LAMELLARIS.—I have recently met with considerable numbers of *Stephanops lamellaris*, of which a figure is given at page 277 of SCIENCE GOSSIP for 1866. I have not been able to find any later reference to this animalcule, and my object now is to inquire if there is any ground for believing it to be the male of a species which I find with it in considerable numbers which does not possess the frontal plate of Lamellaris, but is like it in many respects.—*Edwin Holmes.*

PREPARATIONS FOR THE DESTRUCTION AND PREVENTION OF MITES IN ENTOMOLOGICAL COLLECTIONS.—I should be glad to know whether any of the entomological readers of SCIENCE-GOSSIP use any other preparations than the following for the above purpose: camphor, naphthaline, bisulphide of carbon, benzole, and mercuric bisulphide (corrosive sublimate). I should also be glad to hear from any entomologist who has used the oils of cajaput, anise. thyme, marjoram, amber, or turpentine, or any of them (mentioned by Dr. Knaggs at page 120 of the new "Lepidopterists' Guide." As I am collecting information upon the subject, I should be glad of answers through the post.—*W. J. V. Vandenbergh, Hornsey, N.*

PARASITES IN SNAKES.—It may be interesting to the readers of SCIENCE-GOSSIP to know that the *Tæniæ* infest the bodies of snakes as well as the mammalia, and I shall for the sake of those interested in the study of Entozoa describe the result of some of my investigations:—In the low country of Ceylon, about an elevation of 2000 feet above the sea, there are a considerable number of snakes known to Europeans as "Green Tick Polongas," or "Patchey Polongar" of the Tamils. These creatures are usually found in low scrubs, bushes, and underwood, sometimes in the vicinity of water, and at others in garden hedges. In their movements they are slow, and rarely offer to move away when discovered, usually resting with their heads placed close to the coils of their stout bodies. The head is flat and broad, with great depth of gape. The poison fangs are nearly hidden when unexcited, and are much curved in outline; they are so placed, that I am of opinion that unless the stroke were given to one side or the other, the fangs could not inflict a wound, as they appear too curved to present the point in a forward strike. The eyes are large, and deeply set. The length of body ranges from three feet and downwards. I have never secured any of a greater length than the above. The body is very stout and powerful, but, like the vipers, the tail comes rapidly to a blunt point. The general colour of this "Tick" is green, varied by markings of dark brown, throughout the region of the back; the entire ventral surface being green. These snakes, as far as I can discover, are subject to the ravages of a species of tapeworm, of which I append a rough sketch taken from a microscopic view of one that I extracted from the intestines of one of the reptiles. I found, upon a careful examination, that there were no less than six tapeworms, and each appeared to be mature. They were each about a foot in length, by about $\frac{1}{10}$th of an inch wide in the widest part. The entire body consists of small segments, of from $\frac{1}{10}$th to $\frac{1}{16}$th of an inch in length, except at the head, where the segmentation ceases to appear for nearly an inch. The thickness of the body is very small, so much so as to be transparent throughout the greater part of its entire length. The colour is a pale creamy white, somewhat bluish when examined with a microscope. The head (*a*, fig. 102)

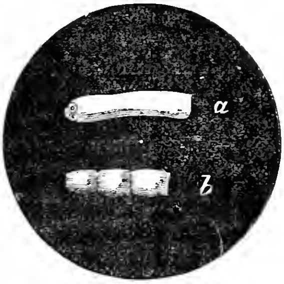


Fig. 102.—Head and Portion of Body of Tapeworm of Snake.

appears to have eye-like spots that have the power of contracting inwards and outwards, but my microscope being of low power, I was unable to detect anything like a mouth or hooks by which the animal could fix itself. When exposed to ordinary air, with the temperature at 78° Fahr., these worms dried up, leaving nothing but a thin film upon a microscopic slide. If placed in water, after extraction from the body they infested, they exhibited considerable power of movement, and continued to live and move for a lengthened period of time, and increased in magnitude, probably from the absorption of water. I failed to detect the presence of ova, though I am aware of the existence of minute eggs in the *Tænia solium*, but this may probably have been owing to the low power of my microscope. It would be very interesting to discover the means by which these worms obtained access to the stomach of the snake, and if different varieties infest different serpents. I may add that the food of the "Green Tick Polonga" is often made up of rats and mice, which they swallow whole, with the exception of the head, that is usually broken up into a "mash." The figure I have given represents the head (*a*) and a portion of the body at its thickest part, both being magnified about twice. In conclusion I may add that the snake is considered venomous, but I have never heard of the bite proving fatal to human beings. The Singhalese "Vederalars," or doctors, say that the bite can be cured, though the cause of considerable suffering.—*F. L., Ballangoda, Ceylon.*

FYLDE DISTRICT NATURAL HISTORY SOCIETY.—We are pleased to see that a society bearing the above name has been founded for this very interesting district of Lancashire.

EARLY INSECTS.—It may perhaps interest your readers to know that on Tuesday, the 9th of last month, I captured two specimens of the "Green Drake" on the water, and yesterday, the 10th, several of the "Grey Drake." Is not this unusually early? I had an idea they never appeared before the end of May, or the beginning of June; Gilbert White never saw the "Angler's May Fly" before June 3.—*G. T. B.*

NORWICH NATURAL SCIENCE CLUB.—At a general meeting of the above club, it was decided to alter the name to that of *Norwich Naturalists' Field Club.*

BOTANY.

MALFORMATION OF DAISY.—During the Easter holidays a friend found in Bloodshot Woods, Tunbridge, Kent, a common daisy malformed, the peduncle near the head half divided into two, there being a groove almost cutting through the stalk. Each branch was continued into a disc made up of tubular florets as usual, joined to each other on the inner side, the whole surrounded by an oval ring of ligulate florets, slightly puckered in where the yellow discs coalesced. I have no work on the subject at hand, and am therefore unable to say whether this is a common phenomenon or not. Perhaps some of your readers know what I mean.—*E. G. H.*

GREEN PRIMROSE.—I have just met with a specimen of the common primrose (the "pin-eyed" variety), in which the corolla is exactly of the usual size, shape, and veining, but the petals are denser and their cells are filled with chlorophyll, exactly like that which gives the leaves of the primrose their characteristic tone of greenness.—*J. E. Taylor.*

PRUNUS SPINOSA (VARS.).—The common blackthorn and its varieties have perhaps never assumed so marvellous a white dress as this year. Every spray is literally a sheet of white, and the individual flowers are considerably larger than we have ever before noted. Blackthorn is very common to the bushes and hedgerows of the inferior oölite, but it is always shy of fruiting.—*Js. Buckman, Bradford Abbas.*

VIOLA ODORATA.—A remarkable fact of this wonderful season has occurred in regard to what the fox-hunter irreverently calls the "stinking violet." This sweet flower, *Viola odorata*, has actually flowered and gone out of flower long before the sport has been given up for the season. With some it is a matter of boast to have killed a "May-fox," but this year almost before the beginning of April the sweet violet had done flowering.—*Js. Buckman, Bradford Abbas.*

THE TRUE MAY (*Cratægus oxyacantha*) in the middle of April is in flower this year, and shows greater promise than is often witnessed until the end of the May month.—*Js. Buckman, Bradford Abbas.*

PERIDERMIUM PINI.—I have found this interesting fungus on the 20th of April, growing in moderate quantity on young fir-trees, about two miles from Storrington. The fact of its having been found in different localities proves that this fungus is not so rare in England as it was at first supposed.—*J. Tempère, Storrington.*

PRUNUS AND PYRUS.—Strolling in my orchard and examining the wonderful wealth of bloom with which every tree was this year loaded, I observed that while in the genus *Prunus* (the plums and cherries), whose flowers have one style only, the short inner stamens ripen their pollen earlier than the outer ones; in *Pyrus*, the pear, with 3 to 5 styles, the outer stamens ripen first. All the plums were visited by multitudes of tawny-coloured flies, whereas about the pear-trees there were only a few honey-bees. Perhaps the ripening of the pollen may have some relation to the size and habits of these insects.—*F. T. Mott, Leicester.*

PECULIAR CUCUMBER.—In the forcing house in my garden there is a cucumber growing about ten inches long, from the side of which a leaf is growing, about three and a half inches in length. Is this not of very rare occurrence?—*George H. Payne.*

GEOLOGY.

STONE IMPLEMENTS.—A fine specimen of a so-called perforated hammer, weighing over two pounds and found near Hemel Hempstead, has just come into my possession. The perforation is what is called "double bell-mouthed;" and, as I do not meet with any satisfactory explanation of this singular shape, I would suggest one of my own. Should my conjecture be correct, hammer would be an inappropriate word, for I am inclined to think that the hafting must have consisted of a handle driven in and projecting on either side. Supposing this to have been the case, the double bell-mouthed perforation can easily be accounted for. When fresh made the two entrances of the perforation would, in all probability, be slightly larger than the centre, owing to the natural tendency there is, in driving holes into hard bodies, to make the upper larger than the lower part. It is also needless to remark that a great saving of trouble could be effected by commencing on the two opposite surfaces and meeting in the middle. Now suppose the tool to be ready for use, the two handles grasped in the hands of the workman and the blows given to fall slightly sideways, the stone would twist, leaning with the opposite edges of each entrance of the perforation on the handles. Then by a constant repetition of blows and an occasional revolution of the stone, two conical holes, converging towards the centre, would result. On passing a rod through the perforation of the one I am writing about, I find that, when the rod rests on the extreme edge of one side of the aperture, it also touches the extreme and opposite edge of the opposite aperture. From this I conclude that it was used as a double-handed hammer, and that the bell-shaped perforations are due to the revolutions of the stone and consequent friction.—*B. Piffard.*

NOTES AND QUERIES.

WINTER NEST OF THE HARVEST MOUSE.—The harvest mouse (*Mus minutus*) is very common in our upland corn-fields, but I never yet detected it in marshy districts, or on the moorlands. The boys from the grammar school are never at a loss to find out its winter quarters, in sandy hedge-banks, in miniature burrows, in which a nest is made with dried grasses. In this respect it differs in its habits from the *dormouse*, for the latter reposes snugly rolled up at the bottom of a thorny bank, but never in a burrow. Again we find the nests amongst tall reeds and withered grass stems, in our marsh ditches, close to the side of the ditch bank, but we have invariably decided they were the nests of the short-tailed field mouse; now, however, our eyes are opened, by the brief note in January SCIENCE-GOSSIP. We purpose doing our best, to find out their nature, before the present winter is gone. Would our friends in the south of England, also keep a sharp look-out?—*R.*

SWALLOWS' NESTS.—Some years ago, when on a visit to Asfordly, near Melton Mowbray, a similar case occurred there to that mentioned by your correspondents. Two pairs of swallows built their nests on the beams which supported the roof inside the school-room and reared their young, and notwithstanding the noise and bustle of over one-hundred children, the birds were continually flying in and out of the school-room all day long, and never seemed to be at all disconcerted, their place of ingress and egress being through a sliding ventilator which was always kept open.—*John H. Webb.*

SWALLOWS' NEST.—About ten years ago a pair of swallows built a nest in a shed here, and one day, before the young were fully fledged, the structure gave way and all the youngsters were thrown down. Hearing a noise I looked in and found them all helpless on the floor; I picked them up and placed them in a tin dish and nailed it to the rafter, where the nest had dropped off, the old ones continued to feed them, as though nothing had happened. That tin dish still remains and two broods of young swallows have been reared in it every summer since.—*W. Sim, Fyvie.*

SWALLOWS' NESTS.—I know positively that there has been a swallow's nest in the timber of the roof of a partly-open shed in a chemical works in Kent, every spring, for the last three years, and I have been told that there was a nest there before. The shed contains a number of tanks used for cooling oil, and there are generally two men at work there every day, and all day long, and very often more men in the shed and yard adjacent. I have repeatedly seen the birds fly in and out while the men were at work and while I stood in the shed myself. One year (I think, 1880), there were two broods of young ones hatched, and three of them were found dead in the oil tanks, we supposed through suffocation from the hot fumes. We could never decide whether it was the same pair of birds, that came every year, or whether a fresh pair came.—*Edgar Hall.*

Birds' Nests at Northallerton.—The following account of the nesting of several of our rarer birds may probably be of interest to some of your readers; they are extracted from my note-book for the year 1880. Lesser redpole (*Linaria minor*): five nests were found in the hedgerows near the town; indeed, they appear to be not uncommon, but are not easily detected. The nest is situated high up in the hedge, and is small, compact, and neat, beautifully lined inside with the silky pappus of composite plants. The old bird sits very close. One of the nests was deserted, and I secured it for my collection. Linnet (*Linaria cannabina*, Swains.): I found this species nesting very early in the spring. The nests are often placed several feet high in a hedgerow, although the favourite locality is a low furze bush. Twite (*Linaria montana*, Selby): by an accidental occurrence I was enabled to find the nest of this species. It was situated close to the ground, under a whin bush, against the side of a bank. I stooped to pluck a flower, and the bird flew out just under my hand, and alighted a little distance off. The nest contained three eggs, two of which I blew. They were slightly incubated. One of them is in my own collection, the other in that of Mr. G. Weldon. The nest was lined with a mixture of feathers and the pappus of thistles. Pied flycatcher (*Muscicapa luctuosa*): a nest of this species was found in a hollow pollard willow, growing in a plantation by the side of the Wiske. The hole had apparently been recently enlarged, but I hardly suppose it would be done by the bird. Several snipes' nests were found, and I noticed as a curious occurrence, that one of the eggs was always much darker, and more blotched than the other three. Query—Was this the first laid? Or has the sex of the enclosed bird anything to do with the variation in the colour of the egg?—*J. A. Wheldon, South Parade, Northallerton.*

Nut-trees.—With reference to your correspondent's remarks on the "odd vagaries" shown by the nut-tree this year, I may say that I have for some years noticed the flowering of the hazel, and so far as this district is concerned I see nothing unusual. Granted the male flowers are exceptionally numerous, I think there is no doubt this is owing to the very mild winter we have had. In other seasons the first flowers are often cut off by the frost, and to provide against the dearth of pollen, which would necessarily arise when the female flowers were matured, other catkins appear later on. This year however as the earlier flowers have not been nipped, there may seem, and possibly is, an apparent excess of catkins. I think all the "odd vagaries" your correspondent mention are simply owing to the mildness of the season.—*John Rasor.*

An Army of Caterpillars.—We shall begin harvest next week. Our crops are pretty good and so are most in this district; but the caterpillars are beginning on the oats in some parts. The caterpillars come in armies. They do not eat the oats, but climb up the straw and bite the oats off, and very soon do a great deal of damage. As an instance of the numbers they come in, about this time last year they stopped a train at Turakina, about fifteen miles the other side of Wanganui. An army of caterpillars was crossing the line and the wheels of the train got so slippery that they would not bite on the rails, and so the train came to a stand-still. In about five minutes every carriage in the train was swarming with caterpillars.—*Hawera, New Zealand.*

"Setting" Lepidoptera.—In reply to G. H. B. (Science-Gossip, p. 93), entomologists usually touch the base of the wings of specimens which have been "relaxed" with a strong solution of gum-tragacanth in water; by this means the wings are kept permanently in the desired position, and very rarely afterwards "spring." The gum should be applied to the under side of the wings after the specimen has been removed from the setting-board. The cause of G. H. B.'s specimens "springing" is not difficult to discover. The specimens should always remain on the setting-board at least ten days in the summer and fourteen days in the winter. Four days is altogether an insufficient time to allow the specimens to become thoroughly dry and set.—*W. J. V. Vandenbergh.*

Wasps, co. Wicklow.—The note on wasps in Science-Gossip for April, 1882, ought to be dated "August, 1881," as otherwise it is calculated to mislead.—*G. H. K.*

Hardiness of the Pike.—A friend of mine went out trawling in a small river at Thame in Oxfordshire for pike last autumn; he hooked a large fish and almost landed it, but it broke the line and escaped. About two months afterwards a man was netting in the same river and about the same place, when he caught a pike weighing about eight pounds with two or three yards of line wound round its body, and the trawling-hook right down its stomach; still more surprising it was alive and in very good condition.—*F. H. Parrott.*

Sparrows.—I have repeatedly seen and obtained in this district, and in several parts of Yorkshire and Lancashire, sparrows having white feathers both in their wings and tail. At the present time and for some weeks past, amongst the many sparrows that frequent the gardens here, I have noticed one with two white flights, and I do not think it is a very uncommon occurrence, especially in young birds, many of which moult into their normal plumage. I don't know whether your correspondent has also noticed how much their beaks vary in colour, some being of a dark and others light or flesh colour.—*H. H. Collinge, Leeds.*

Weasel or Stoat.—In the January number of Science-Gossip, page 22, a member of the Belfast Field Naturalists' Club seems to doubt my veracity regarding my statement that the weasel is found in the neighbourhood of For-head, co. Antrim; the *onus probandi* lies with him to show it does not exist. His quotation from W. Thompson in his "Nat. Hist. of Ireland," strengthens my assertion, as although the writer "does not himself consider that the species has yet been satisfactorily proved to be native" yet he says "it may be so" and even states that two skins of the true weasel were given to him in 1842, which were said to have been obtained at For-head. I never misquoted Mr. Thompson's statement, as the writer asserts, nor do I desire to mislead naturalists. I am well acquainted with both species, the stoat being very common in the locality where I am now residing.—*Rev. S. Arthur Brenan, Allan Rock, co. Tyrone.*

HEN CANARY.—*A propos* of the note by Stuart McB. in your February number, I must tell you that some years ago my father had a hen, she was as large as a male and crowed lustily. Let me suggest however that the canary in question may be a male in female attire, as birds are known to assume the plumage of the opposite sex, as the female to wear the dress of the male and *vice versâ*. I have heard of a linnet that had one wing, that of the male, and the other that of the female; the same thing is also to be met with amongst butterflies.—*Clara Kingsford, Canterbury.*

BIRDS "TAPPING AT THE WINDOW."—During the autumn and spring numerous flies, on windows looking east, generally congregate in swarms in the crevices, and when there is a hot morning sun come out to bask in it. Often of such a morning I have heard a "tapping at the window" by a bird outside, often a wagtail trying to catch the flies through the glass. Last week there was a tortoise-shell butterfly in my window, and on two or three occasions I heard the tapping of a hungry bird. Will this explain the tapping mentioned by W. R. T. in your number for April 1st? I have also known of a magpie tapping. Why he should do it I cannot imagine, except that he saw his figure in the glass, and pecked at the "other fellow that was looking at and jeering him"?—*G. H. K.*

THE COMMON LIZARD.—On Sunday, March the 19th, 1882, while taking a walk in the morning I went up Red Hill at New Cross, and taking a turn to the left at the top of the hill into a road where they are building, I saw some tree stumps that had been cut down to make room for that fell destroyer of our country lanes and fields, namely, bricks and mortar. I went up to them to see whether there was any of our land snails on them, and was rather surprised to find a fine specimen of our common lizard clinging to it. I grasped it with my hand near its head; but I had scarcely done so when it snapped off its tail about half an inch from the body. The tail jumped about in all directions; but I picked it up, and took it home. I placed the lizard in a glass case that I keep for the reception of such things, and have kept it in the same till yesterday, Sunday, April the 2nd. It took flies and drank milk that I gave it very well; but in the evening I looked into its case and was rather surprised to see it stretched out apparently dead, and spots of blood about the case and coming from its mouth. I opened the case and took it out. It was not quite dead, but nearly. I placed it in spirits. It jumped about in the bottle for a second or so and then died. Its contour, bright orange on the belly, and mottled brown and black on the back. If any of those correspondents who so kindly answered my query about newts near London, could tell me how to account for its coming to such a queer kind of death, namely, bleeding at the mouth, I shall feel much obliged.—*J. Roberts.*

LAND SNAILS.—Could any correspondent kindly inform me as to the best hunting ground for our land snails near London; also a locality for the fresh-water mussel, and oblige—*S. Roberts.*

GEOLOGY OF LANCASHIRE.—I propose spending a few weeks in Lancashire this year, and should be glad if any of your readers could give me any information on the geology and entomology of that county.—*A. S.*

WHITE HEATHER.—Seeing in February's number of SCIENCE-GOSSIP, notes on the occurrence of white heather, it may interest some readers to hear that I found a patch of it some years ago in Cheshire on the eastern flank of a hill (Teg's Nose), near Macclesfield, 1320 feet above sea level. It grew luxuriantly, and near it was *Vaccinium Vitis-Idæa*, but I have never seen it since.—*C. Garland, Owens College.*

SETTING LEPIDOPTERA.—If G. H. B. would try the remedies given by the Rev. Joseph Greene in his valuable little work "The Insect Hunter's Companion," the wings of his insects would not spring. All insects relaxed should be touched with a portion of liquid glue under the wings, at their juncture with the thorax.—*J. P. Hiller.*

SETTING LEPIDOPTERA.—The *modus operandi* which I have successfully adopted for setting lepidoptera, which I have kept in papers, is, after relaxing them by steam, to put a small drop of shellac dissolved in alcohol at the base of each wing. A fine knitting-needle is a good instrument for applying this liquid, which soon hardens, and if the moisture in the insects be evaporated by placing the setting-boards near the fire for a few minutes, they can be removed from the boards in about twenty-four hours, without any fear of their springing back. Care must be taken not to put on a large quantity of shellac, or it will spread over the wings, and the groove of the setting-board must be sufficiently large to prevent contact, or the insects will adhere and be spoilt. In the case of altering the position on the pin, consequent on the adoption of a different style of setting, I put a drop of the same liquid on the under side of the body, and this is best done after removal from the setting-board. G. H. B. omitted to give his address, so that a direct answer was impossible, but any further information will be cheerfully afforded by *F. S. Hockaday, Newport, Mon.*

RE-SETTING LEPIDOPTERA. (Vide p. 93.)—G. H. B. will find that the wings of all relaxed insects have a tendency to "spring" after being re-set. To prevent this, and after removing them from the setting-board, touch the insertions of the wings with shellac, liquid, elastic, or ordinary glue; any of these, when set, will prevent their "springing."—*Robert Laddiman, Norwich.*

MICROSCOPIC TANK.—I should be much obliged to any one for information how to make a small tank for microscopic use, say 10" long, 8" deep, 2" wide, opaque ends and bottom.—*Hickin.*

WAGTAILS.—About the middle of last February a green wagtail arrived on the roof of a house opposite my bedroom, and commenced a series of assaults against the window, flying at it repeatedly every day for upwards of a fortnight, then disappearing as suddenly and mysteriously as he came. The bird carefully avoided the open part, and only on one occasion could we entice him to enter and pick up the seeds placed on the table. Once he was accompanied by a mate, and much chattering took place between them. I mentioned the occurrence to a friend, who seemed not unfamiliar with the phenomenon. He suggested that the glass possibly, having some reflective properties, had provoked the combative (amatory?) instincts of our little assailant, and advised the placing a mirror opposite the open window. We tried the device; but waggy was not tempted by the mirror. I may add that the same superstition was hinted at by some of our neighbours. —*J. Snell, F.G.S.*

ACHERONTIA ATROPOS. (Vide p. 94.)—It is not a safe plan to force the pupæ of *A. Atropos.* Under ordinary conditions, the moths should emerge about June. A large portion of the pupæ of this species, however, produce imagines, the same autumn, which are mostly barren females. It is very necessary to keep your pupæ moist to enable the moths to break through easily. The best way is to keep them in damp moss, which should first be baked, to destroy any insects that it may contain. The pupæ should be looked to occasionally, for with too much moisture they are liable to become mouldy.—*R. Laddiman, Norwich.*

REASON OR INSTINCT.—Perhaps the following facts may be of interest to those who have turned their attention to the vexed question of the existence, in the lower animals, of a faculty, if not identical with reason, at least very nearly akin to it. In a large boarding school in the West of England, we have a spaniel that shows remarkable intelligence. He owns no individual as his master, but claims to belong to the boys collectively, accompanying them in all their walks, going with them into the playground when lessons are finished, and returning punctually into the schoolroom at the first sound of the bell. On Sundays we are in the habit of attending two services at church, one in the forenoon, and another in the evening; while, in the afternoon, if the weather is fine, we go for a long country walk. Sancho is always in a state of the utmost excitement to start with us on these walks, but nothing will induce him to stir when the boys are about to set out for church. Yesterday, March 13th, however, his conduct seemed to call for particular notice. A special service had been intimated for the afternoon, and we decided to attend it, and take our walk in the evening. Sancho was present while this arrangement was being talked over, and looked so knowing that we resolved to watch him. On assembling in the playground just at our usual time for starting, Sancho was not amongst us, but sat in the doorway looking very much disgusted at the idea of losing such a glorious afternoon for a run. No amount of calling and coaxing, however, had any effect upon him. He seemed to recognise that we were what is vulgarly called "humbugging" him, but was determined not to give way to what must have been his natural impulse to rush out and join us. In the evening, on the other hand, when on ordinary occasions he never attempts to go with us, he was full of animation, and was all eagerness to start. Calling to him, I ordered him back into the schoolroom, telling him it was highly improper for dogs to appear in church; but with a sly look into my face he bounded off to the head of the column, absolutely refusing to pay any heed to the prohibition, and of course his sagacity and disobedience were rewarded by his enjoying the walk. This is only one out of many marks of intelligence that he has shown, in face of which it is very difficult to believe that he is actuated only by an "untaught ability to perform actions necessary or useful to the animal." In an interesting note by Dr. Kegan in SCIENCE-GOSSIP, September 1879, the writer attributes complex cases of so-called instinctive actions to a powerful development of the *sensori-motor* ganglia. Would such an explanation hold in the present case? True the passive resistance to the dog's natural impulse might be regarded as a "mode of motion;" but it certainly seems to be an unwarrantable stretching of the theory to apply it in such a way. Some other explanation must be found, or, to be consistent, we shall have to admit that the whole moral nature of man is merely the result of a "powerful development of the *sensori-motor* ganglia."—*A. Geddie.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

H. CROWTHER.—We shall be very pleased to have your paper on "Molluscan Jaws."

B. S.—We always like to have a person's full address, and make it a rule not to reply otherwise. But as your handwriting suggests we are dealing with one of the fair sex, we shall be content with stating the rule. You will find that Dr. M. C. Cooke's "Ponds and Ditches," published at 2*s*. 6*d*. by the Christian Knowledge Society, will be very useful as a first introduction to the study of microscopic plants. There is no doubt the plant of which you send us a rough sketch of structure is one of the *Confervæ*. We do not understand *which* examination in Botany you allude to—that of the South Kensington Department or that of the Pharmaceutical Society. You had better inquire.

F. H. STREATFIELD.—We have not heard of any parasites being found on cheese-mites.

"NORTHUMBRIAN."—Denny's "Monograph of the Anoplura" is the most exhaustive on that group of the Ectozoa. Van Beneden's popular work (one of the International Scientific Series) on "Animal Messmates" gives a very philosophical outline of their functions and relationships. See article on "Parasites" in *Micrographic Dictionary.* We always publish SCIENCE-GOSSIP about the 25th of each month.

M. A. HENTY.—The red insects were the well-known "red spider," one of the chief pests of the gardener. The other insect is the female of *Coccus squamifera* (nearly allied to the Cochineal insects); the body of the female acts as a cocoon for the eggs she lays.

G. H. BRYAN.—The entire natural order of plants to which the cucumber belongs is dangerous. Some of them are acridly poisonous. It would appear as if the poison was present in the cucumber chiefly in the dark green rind, in a modified degree however. The most poisonous plant in this order is the *Colocynth*, and the specific poison is allied to that obtained from that plant.

J. G. SHARP.—We are always desirous to give such help in assisting to name specimens as could not be supplied by the querist himself. Of course, where a man can find the name of a plant, animal, or fossil for himself, with a little trouble, we expect he will do so. No specimens were in your letter when it reached us.

L. L.—The moss enclosed is a common species called "rope moss" *(Funaria hygrometrica)*; the fragment of other plant appears to be that of the moss saxifrage *(Saxifraga hypnoides)*, but it is too small to tell definitely what it is. Dr. M. C. Cooke's "British Reptiles" (published by Bogue) and Bell's "British Reptiles" (Van Voorst) are the best works we have on this subject. Wood's "Insects at Home" will give you a good idea of our common insects; so also will Staveley's "British Insects."

J. M.—It should be distinctly understood that gratuitous exchanges should not exceed three lines; they only crowd others out.

EXCHANGES.

WANTED, *Rumex sanguineus* proper. Please state requirements to A. Heath, 114 Ebury Street, S.W.

IN exchange for foraminifera or diatomaceæ, a well-mounted slide of the eggs of sheep fluke.—C. E. W., 31 Darley Street, Bradford, Yorkshire.

A NUMBER of eggs and stuffed birds (British) for exchange. Lists exchanged.—J. A. Wheldon, 9 South Street, Scarborough.

UNMOUNTED leaves, *Eleagnus* and *Hippophae* spores, *Lycopodium*, sand from Margate, and others in quantity for mounted objects.—G. H. Bryan, Trumpington Road, Cambridge.

WOULD exchange good specimens of trap rocks for minerals of various kinds or foraminiferous washings.—George Patterson, J. Walker & Co., Princes Street, Greenock.

WANTED, living specimens of the cricket and death-watch in exchange for *C. fulgida* (tansy beetle) or other natural history objects.—Edward J. Gibbins, 20 Bootham, York.

FOR exchange, about twelve dozen micro slides. Wanted, works on science or natural history, &c., or shells. State published price of books.—John Alexander Ollard, F.R.M.S., Ye Hermitage, Forty Hill, Enfield.

Asarum Europæum, living plants now in flower offered in exchange for *Primula scotica*, *Polypodium alpestre*, *Cystopteris regia*, *Asp. germanicum*, or *Woodsia Ilvensis*.—James W. Lloyd, Kington, Herefordshire.

WANTED, Echinus spines, British and foreign (not fossil). Will give in exchange well-mounted Echinus spine sections or other superior preparations.—H. Hensoldt, 7 Machell Road, Nunhead, London, S.E.

WANTED, correspondents in all parts of the world to exchange microscopic slides or material. All communications answered. —F. L. Carter, 20 Trafalgar Street, Newcastle-on-Tyne.

ANATOMICAL, pathological, and other slides in exchange for parasites, mounted or unmounted. Send list first.—F. L. Carter, 20 Trafalgar Street, Newcastle-on-Tyne.

WANTED, "Reeve's British Land and Freshwater Shells," or any similar work; also rare British shells. A liberal exchange given in dried British mosses or flowering plants, or microscopic slides.—O., 15 Horton Lane, Bradford.

WILL exchange "Ibis" of January and April 1881, with ten coloured plates, for "Zoologist," from January to June inclusive. —H. F. Allison, Saltaire, Shipley, Yorkshire.

WANTED, first-class botanical and geological slides, rock and bone sections, also double-stained vegetable tissues and other good objects. Offered in exchange, anatomical and pathological preparations, and a variety of well-mounted interesting specimens.—F. R. Martin, Malvern House, Clevedon.

SIX dozen micro slides for exchange.—Send list to John Alex. Ollard, F.R.M.S., Ye Hermitage, Forty Hill, Enfield.

WANTED, microscopic material for mounting lichens, fungi, fern fructifications, or miscellaneous. Will give in exchange well-mounted slides of crystals for polariscope, parts of insects, or other material.—George J. Wightman, 33 Tresco Road, Nunhead.

DUPLICATES, parthenias, corydon, euphrosyne, maculata, &c. Wanted, athalia, cassiope, davus, rubi, W. album, pruni, betulæ, actæon, paniscus, sinapis, clearwings, in any stage.—Fred. W. Frohawk, "Haddon," Upper Norwood, S.E.

SLIDES of fungus (*Tinea decalvens*) in human hair for other well-mounted slides.—Send lists to W. Hamilton Reid, Yarm-on-Tees.

WANTED, unmounted specimens of *Xenodochus carbonarius*, *Podisoma juniperi*, *Trichobasis oblongata*, also *Lolium temulentum*. Will give mounted slide crystals, milk, sugar, very beautiful, with polarised light.—A. Smith, The Laboratory, Essex Road, Islington, London.

WANTED, unmounted various diseases of wheat to exchange. —A. Smith, The Laboratory, Essex Road, Islington, London.

Bryum neoadamense, *Hypnum sendtneri*, var. *Wilson*, &c., for other mosses, British or foreign.—J. Harbord Lewis, 145 Windsor Street, Liverpool.

WANTED, diatomaceous deposits and dredgings from all parts of the world; Bermuda tripoli, Barbadoes earth, and Monterey deposits specially wanted. Will be glad to hear from correspondents abroad.—T. E. Doeg, Evesham.

WANTED, living (preferred) or well-set specimens of the following:—*Melolontha pello*, *Melolontha amatus*, *Lucanus cervus* (♂ and ♀), *Lampyris noctiluca* (♂ and ♀), and *Chrysomela cerealis* in exchange for Lepidoptera, birds' eggs, or other Coleoptera,—H. H. Collinge, Mount Preston, Leeds.

SIDE-BLOWN eggs of black kite, rough-legged buzzard, curlew, and Buffon's equa offered for those of hobby, merlin, or storm petrel, or for good southern Coleoptera.—H. H. Collinge, Mount Preston, Leeds.

WANTED, to exchange for other species:—*Vertigo edentula*, *Planorbis nautileus*, *Limnæa glabra*, *Helix rupestris*, and *Limnæa peregra*, var. *Burnetti*: these last are dead shells from Loch Skene, but very fair specimens of so rare a variety.—S. Donald, Sedbergh, R.S.O., Yorkshire.

RARE sections for the microscope of Devonian corals, and a great many others from other counties; also polish slabs of the same corals, British and freshwater and land shells, fossils, minerals, &c., in exchange for North Lancashire corals, especially Cyathophylloid, which show an interrupted radial arrangement, and more especially of the genus Zaphrentis.—A. J. R. Sclater, Mineralogist, 23 Bank Street, Teignmouth.

BLACK PODMAR will be sent to any reader of SCIENCE-GOSSIP who forwards small tube and postage, and also straw bristle mould on receipt of stamped addressed envelope.—E. Holmes, 149 Essex Road.

WANTED, turntable in exchange for prepared micro material, such as marine algæ ready for balsam, zoophytes, sertularians, molluscan palates, minute crustaceans, and larva, and various other marine objects of interest.—T. McGann, Burren, Co. Clare.

FORTY kinds of fish scales, forty kinds of seeds, eighteen kinds of zoophytes, unmounted, for exchange for well-mounted slides. Will give sufficient to make two or three slides for each slide offered.—Lists to B., 36 Windsor Terrace, Glasgow.

MIOCENE fossils, including thirty species of foraminifera from the Vienna basin, large spec. of spongilla, offered in exchange for British fossils, recent shells, or foraminifera.—Dr. Rudolf Haeusler, F.G.S., &c., Dedham, Essex.

WANTED, Bates' "Amazon," in one or two volumes. Offer, Madagascar and Brazilian butterflies, beetles, or spiders.—Thomas Workman, Bedford Street, Belfast.

Myosuris minimus in exchange for other botanical specimens, mosses preferred; what offers?—A. E. Gibbs, The Hollies, St. Albans.

OVER 600 different genuine postage-stamps to be sold or exchanged.—Wanted, all kinds of natural history specimens, Wilson's "Bryol. Brit.," and other books. Will send list.—W. G. Woollcombe, The College, Brighton.

Lecidea canescens, in fruit, offered in exchange for other rare lichens.—J. H. Bloom, Westbury House, Worthing.

VOLS. 1, 2, 3, "Magazine of Art," 40 Parts of "Garden Flowers," and 4 vols. of "The Sea" (Cassell), unbound, in exchange for mahogany microscopic object cabinet.—J. W., 2 Oval Road, N.W.

WILL exchange well-mounted carmine injections of lung. liver, kidney, spleen, pad of foot, meibomian glands of eye, pia mater, cerebrum of cat, also vermilion injections of lung and intestines of domestic fowl, ciliary processes and choroid vessels of eye of ox, for equally well-mounted slides from animal, vegetable, and mineral kingdoms.—C. A. Lowe, Old Park Road, King's Hill, Wednesbury.

WANTED, animal parasites, acari, ixodes, &c.—W. A. Hyslop, 22 Palmerston Place, Edinburgh.

WANTED, in fruit, *Archidium phascoides*, *Pleuridium nitidum*, *Buxbaumia aphylla*, and *B. indusiata*; also *Habroden Notarisii*. Exchange in greenhouse ferns.—Miss Ridley, Hollington, Newbury.

A COLLECTION of named fossils from almost all strata, some polished pebbles and minerals in exchange for coins, tokens, military or naval war medals, &c.—Leonard Stanley, 6 Clifton Gardens, Margate.

WANTED, nine volumes of SCIENCE-GOSSIP in exchange for nine volumes of "Design and Work," four of which are partly bound and the rest bound.—Lester Francis, 20 Frogmore Street, Abergavenny.

WILL exchange a Henley's telegraph galvanometer, in perfect order, for a double nosepiece in good condition.—A. Hickin, 1 Tamworth Villas, Hornsey Road.

WANTED, curious animal hairs, horn of rhinoceros (small piece for section), claws, &c., anything good. Exchange wood sections, well cut and correctly named.—A. Hickin, 1 Tamworth Villas, Hornsey Road.

SOME birds' eggs instruments in exchange for birds' eggs.—J. S. Whittaker, Vicarage, Bredbury, near Stockport, Cheshire.

BOOKS, ETC., RECEIVED.

"Geological Essays at Home and Abroad." By Professor A. Geikie, F.R.S. London: Macmillan.

"Studies in the Theory of Descent." By Dr. A. Weismann. Part III. London: Sampson Low.

"Half-Holiday Handbooks." Neighbourhoods of Croydon, Richmond, Dorking, Kingston, Reigate, Tunbridge Wells, Greenwich and Blackheath, Geological Rambles round London. 8 vols. 9*d*. each. London: Marshall Japp & Co.

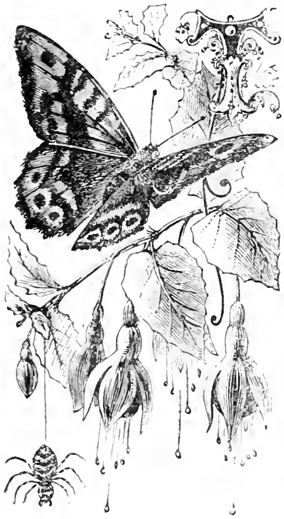
"Northern Microscopist."
"Midland Naturalist."
"Scottish Naturalist."
"Land and Water."
"Ben Brierley's Journal."
"The Analyst."
"Annual Report, Hackney Microscopical, &c., Society.
"Twenty-fourth Report, East Kent Natural History Society."
"Studies in Microscopical Science," Nos. 1 and 2.
"Annual Report, School of Mines, Ballarat."
"The Southern Science Record."
"American Naturalist."
"Boston Journal of Chemistry."
"Bulletin, Torrey Botanical Club."
"Procès-Verbal, Société Belge de Microscopie."
"Le Monde de la Science."
"Cosmos: les Mondes."
"La Science pour Tous."
"Feuille des Jeunes Naturalistes."
&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT. FROM:—E. G. H.—F. H. S.—B. P.—H. J. R.—C. L. L.—E. J. G.—J. A. O.—J. W.—G. P.—T. C. R.—W. B.—J. B.—G. D.—W. J. D. V.—F. T. M.—W. H. W.—J. R.—E. E. E.—J. T. L.—J. G. S.—J. B. J.—J. W. L.—B. S.—A. H.—C. E. W.—W. W. W.—J. A., jun.—F. F.—J. T. R.—G. H. B.—J. A W.—W. J. V. V.—A. M. D.—J. S. W.—W. A. L.—M. U. J. F. C.—A. H.—L. F.—J. R.—C. A. L.—W. G. W.—J. H. B.—J. W.—W. A. H.—L. S.—J. T.—S. W.—E. L.—J. A. O.—A. S.—E. L.—W. W.—W. H. R.—W. H. H.—W. F.—T. E. D.—H. H. C.—J. H. L.—J. S.—M. S. D.—F. L. C.—W. H. W.—G. R. R.—G. B.—G. J. W.—H. J.—F. R. M.—F. W. F.—A. M. F.—H. P. M.—T. P. D.—H. H.—T. R. J.—E. H.—Dr. R. H.—B. L.—A. J. R. S.—Dr. M.—A. B. P.—H. P. M.—J. F.—T. W.—J. J. M.—G. H. P.—E. H.—J. A.—J. B.—G. T. B.—J. S.—&c.

THE DIASTOPORIDÆ: OR THE NATURAL HISTORY OF A FAMILY TYPE.

By GEORGE ROBERT VINE.

[*Continued from page* 83.]



THE family Diastoporidæ is defined by Busk, "Zoarium* crustaceous or foliaceous, discoid or indefinite in outline, adnate and sessile, or pedunculate, or erect; no cancelli;" and the genus Diastopora is defined, "Zoarium adnate, discoid or flabelliform, centric or excentric; margin entire or lobed; cells toward the centre, wholly immersed, usually suberect, and partially free towards the margin; mouth elliptical or suborbicular, horizontal or oblique."†

The generic meaning of this term is that the cells are separated, or that there is a small intervening space between the pores. There are no "cancelli," or smaller openings in these spaces, so that the family is distinct on this account from another, the Discoporellidæ, in which the intermediate spaces are cancellated or porous. The Discoporellidæ range from the Arctic seas to as far south as Australia and Tasmania.

All the Diastoporæ known to us at the present time as living in our seas are five species, and the geographical range of these is entirely northern. *Diastopora simplex*, the *D. suborbicularis* of Hincks, is distinguished by its papyraceous character, and also by its irregular growth; the cells are deeply immersed, and sometimes the mouths of the cells are nearly even with the surface. This species ranges in space from the Arctic sea to South Devon, where it is very abundant, and the habitat is from shallow to deep water. It is often found on shells and stones, and the dredge has brought up specimens at from 110 to 145 fathoms. Mr. Waters, in his "Naples Bryozoa,"* obtained specimens at from two to six fathoms. This species ranges in time from the present seas to the Miocene of Austria, and a critical study of the varieties will reveal the fact that it will not submit to an entirely arbitrary diagnosis. Or, in other words, between the recent and the fossil specimens, there is a slight divergency from the type, as found in the British Museum Catalogue, though by the laws of precedence the crag *D. simplex* ought to be the type.

In the Crag Polyzoa Mr. Busk says that the "tubes are not flattened in front," but in the Cyclostomata they are merely stated to be "deeply and entirely immersed." The general aspect of the species is that the zoarium is orbicular, or nearly so, and that the cells are slender and very thickly or coarsely punctate. These in some parts of the colony are nearly wholly immersed, and sometimes partially free, and a reference to Busk's figures† will show this double character, more particularly as representative of the crag specimens. The synonyms of this species are somewhat limited, derived chiefly from special characteristics of the specimens examined. The name was originally given by Mr. Busk in his "Crag Polyzoa," but as the species have been associated doubtfully with *D. obelia*, Johnston, and *D. flabellum*, Reuss, Mr. Hincks has redescribed and rechristened it as *D. suborbicularis*.

Another of Mr. Busk's species is the *D. obelia*, Johnston. In this the zoarium is adnate and usually slightly raised in the middle, or umbilicate, orbicular, or irregular in outline; cells produced and partially free and erect. The leading characteristic is, however,

* Polyzoary of previous authors.
† "Cyclostomata," pp. 27, 28.

* Ann. Mag. Nat. Hist., 1879.
† 3 & 4 Pl. 29, "Cyclostomata."

in the "small adventitious tubules" which rise from the back of some of the cells. It is well to note this fact, because when we trace the species backward in time this is a most important test. Recently it is a very prolific species, and the geographical distribution is a very wide one, ranging from Spitzbergen to the Adriatic, and in time, according to Professor Dawson, to the Post-pliocene of Canada. According to present observations it is not a deep-water form, for I can find no details of the species being found below twenty fathoms.

D. patina seems to have been the earliest recorded species, as it was originally described by Lamarck as *Tubulipora patina*. This species has many well-marked peculiarities. It is sometimes discoid, circular or elliptical, and more or less of a cup shape. The central cells are immersed and usually closed, the marginal ones are erect and open. These closed cells have given rise to a variety of opinions. They are supposed by some to be representative of the opercular covering, as in the Cheilostomata, and they are present in another species to which we shall draw attention presently. A very broad basal lamina extends beyond the margins of the species, and is one of the means of its identification. The geographical distribution is also wide, ranging from the North and Arctic seas to the Adriatic, and in depth from five to one hundred and seventy fathoms. At Shetland, according to Barlee and Norman, it is frequently taken at the latter depth, and here also the forms are proliferous; that is to say, fresh colonies are produced on the margins of the older colony—a peculiarity of habit that may be traced back to species which were living in Oolitic times at least, and doubtfully even in the Carboniferous era.

Our next and last British species is *D. Sarniensis*, Norman. Of this species Busk gives no descriptive text, but on Plate 34* he gives a very good figure. There is a striking peculiarity about some of the cells of *D. Sarniensis*, which will justify a more detailed account than I have given of the other species.

In his original description, Mr. Norman † said that it "consisted of a milk-white opaque punctured crust, spreading upon shells with a round or lobulate outline, and sometimes reaching $\frac{3}{4}$ inch in diameter." The most striking peculiarity however is where he describes that "Here and there among the open mouthed cells, there occurs a tube which, instead of being open, is closed above with a little cap, from one side of the centre of which rises an umbonal-like process, which is perforated at the apex. Probably these organs are connected with the reproduction of Diastopora, and are homologous with ovicells." As many of the Diastoporæ both recent and fossil, and also other members of the family Tubiliporidæ have their oœcia as an inflation of the surface of the zoaria, these peculiar cells, both in *D. patina* and *D. Sarniensis*, have given rise to a very pleasant piece of speculation. It will be seen that Norman suggests that they may be reproductive cells, or the homologues of the ovicells. Mr. Hincks says,* "The precise significance of the zoœcia which are operculate, and furnished with the small tubular process at the top, is unknown . . . . and *D. Sarniensis* is furnished abundantly with oœcia of the usual character." In another part,† in describing *D. patinà*, Mr. Hincks says, "It is difficult to determine what the precise function may be of the closed cells, which occur in such numbers in every colony. Smitt has conjectured that they may be connected with the production of Spermatozoa, and notes that in *D. patina* there is sometimes a small tubular opening in the cap or operculum, analogous to the projecting process in *D. Sarniensis*. It may be objected to this view that the closed cells are so numerous as to be out of all proportion to the function assigned to them; but it would be difficult to suggest a better interpretation, and it will do good service by giving direction to inquiry."

In describing *Reticulipora dorsalis*, Waters, the author draws attention to similar tubules. "On the dorsal surface all the cells I have examined have a cover with a projecting tubule in the centre: and on other cells they are very frequent. Similar covers are found on many of the Cyclostomata; but from their frequency. . . I doubt if their significance is fully understood." ‡ Mr. Busk mentions "a minute central perforation," in the calcareous lid of some of the cells in *Mesenteripora*.§ Professor Braun, in his very able paper on the Polyzoa of the Middle Jura, speaks of these opercular cells as a special feature of *Elea foliacea*, and since then Mr. F. D. Longe, F.G.S.,‖ has drawn attention to certain Escharoid forms of Oolitic Polyzoa for the purpose of showing the apparent or real relationship between the Cheilostomatous and Cyclostomatous forms. There are very similar calcareous opercula found in some of the species of Glauconome, Polypora, and Fenestella of the Carboniferous series; and whatever their significance may be they must not, in any sense, be confounded with the horny opercula of the Cheilostomata. For the purposes of classification of the latter group, Mr. Waters has made a very minute study of the opercula of a great number of species, and he finds that so constant are several typical features that whole genera may be arranged under a few general heads, independent of the presence of other characters pertaining to the genera. Thus he says that some of the Lepralia have opercula approaching to the character of Cellepora, whilst other species of Lepralia approach by their opercula to those found in certain species of Eschara and

* "Cyclostomata."
† Ann. Mag. Nat. Hist., January, 1864.

* "British Polyzoa," vol. i. p. 464.
† *Ibid.* p. 460.
‡ Ann. Mag. Nat. Hist. 1879, p. 278.
§ "Crag Polyzoa," p. 110.
‖ "Geological Magazine," January, 1881.

Tubucellaria; and many results had been arrived at by Mr. Waters* long before the labours of Mr. Hincks in a classificatory direction were made known to the public, and although not adopting, Hincks justly acknowledges the value of Mr. Waters's discoveries and investigations.

I have said previously that Mr. Hincks does not use the family name Diastoporidæ, but Tubuliporidæ instead. And this family group embraces, *Stomatopora*, Bronn; *Tubulipora*, Lamarck; *Idmonea*, Lamouroux; *Entalophora*, Lamouroux; *Diastopora*, Lamouroux, part.

A very great discrimination is displayed by Mr. Hincks in this arrangement, for there is a striking similarity between the primary development of all this group—but more particularly betwixt Stomatopora, Tubulipora, and Diastopora; so much so that some species of Stomatopora (Alecto) have been classed by Reuss and Smith as Diastopora, and some of Tubulipora and Pustulopora have been arranged, and very properly so, with Entalophora.

The Diastoporidæ stage is a peculiar one in the life history of colonies of the *Tubuliporidæ*. In its early state, Diastopora very much resembles Tubulipora, and this again resembles somewhat the early stage of some at least of the Stomatoporæ. They originate in a small disc-like base, the primary cell; from this a single cell is developed, and then the primary one becomes a means of attachment; and from this secondary cell, two, three and four are ultimately developed. The Alecto or Stomatoporæ diverge in a kind of branch; the Tubuliporæ also take a branch-like form, whilst the primary cell of the Diastoporæ develops cells which have a tendency to a right and left direction; and before many cells are thus thrown off, a decided circular, subcircular, or orbicular habit is early formed. This holds good with regard to the fossil as well as the recent Diastoporæ; and after closely studying many specimens of Oolitic species, I cannot help saying that the facies of Diastopora are pretty constant. A most interesting feature is recorded by Mr. Waters of *Reticulipora dorsalis*, the generic and specific habit of which is altogether at variance with the family type under discussion. He says, "This elegant species commences as a flat disk, or Diastopora stage," and an Algerian specimen collected by J. T. Johnson, now in the British Museum, "is first a wide irregular Diastopora, from which a wide foliation grows." This particular feature seems to naturally ally the Algerian specimen with Mesenteripora, Busk, species of which have heretofore been called foliaceous Diastopora.†

Attercliffe, Sheffield.

(*To be continued.*)

* The use of the opercula in the determination of the Cheilostomatous Bryozoa. Proc. of Manchester Lit. and Phil. Soc. 1878.

† See Barrois, "Rech. sur l'Embryologie des Bryozoaires," 1877, and "Comptes Rendus," 1875.

SCIENTIFIC PROGRESS IN HERTFORDSHIRE.

THE county of Hertford has never enjoyed a reputation for science and progress. Camden in his "Britannia" says, "For scarce is there any one shire in England that can show more footsteps of antiquity." The footsteps of antiquity are very well in their way, no one would wish them removed; but if, without effacing them, a footing for science can be found, it is much to be desired.

Within the last few years Natural History Societies have been establishing themselves even here. Luton has one, and Hemel Hempsted another, both confining themselves to their respective neighbourhoods. At Watford also there is one, with the title "The Hertfordshire Natural History Society and Field Club."

Since the rise of the Hemel Hempsted Society some little advance has been made in the knowledge of the plants and insects of the district, but here a line on the general appearance of the neighbourhood will not be out of place.

The scenery, though not altogether celebrated, is beyond a doubt beautiful. Whether you stand in the early morning on the high land overlooking the valley and watch the first rays of sunlight warming the chalk cliffs of Rough Down, or mark the long line of white mist as it lies motionless below, with here and there the top of a tree or chimney-pot apparently floating on its surface—it is certainly beautiful.

Or take the Rough Down Side, ascend the moorland above the railway station, and you can scarcely fancy yourself within twenty-three miles of London. How sweetly the thyme scents, and what a grand expanse of wild land presents itself in the direction of Bovingdon, all purpled with heather and dotted with the sharp black foliage of the juniper!

Besides this the valley itself has a beauty of its own, intersected as it is with streams and watercourses. Tall yellow iris; tufted sedges; and tangled waterweeds, though gloomy in themselves, give it a character which contrasts effectively with the brighter slopes of the adjacent hills.

It may generally be noticed that rustic beauty and a varied flora go hand in hand; this is not always the case, but Hemel Hempsted is no exception to the rule. This can be proved by a visit to Foxcroft Wood, just outside the town on the right of the Water-End road (the habitat, by the way, of *Convallaria multiflora*). Foxcroft Wood is on the chalk, and if it only produced the Solomon's Seal it would be worth a visit, but here the *Daphne laureola*, with its shining foliage, is most conspicuous all the winter; and later on *Ophrys muscifera*, and the Adderstongue fern, *Alchemilla vulgaris*, and the Tway-blade, and a curious variety of the common hyacinth of a soft lavender colour are frequently met with, also the lovely *Eupitthecia venosata*.

Descending towards the town, *Mercurialis annua* is abundant, though hitherto unrecorded as a Hertfordshire plant; and in the town, in a small garden in the Alma Road, a fine specimen of *Sphynx Neri* occurred a few years ago; this was duly exhibited and recorded at the time.

This year *Sphynx convolvuli* was taken in my garden, and formerly the curious little wrinkled Tortrix *Phthcochroa rugosana*, was not uncommon. The valley that separates the town from the railway and gives its name to the station—Boxmoor—looks good; it has all the appearance of a prolific hunting-ground; but alas! this is all that can be said about it—to the entomologist it is still a *terra incognita*, it is still unexplored and unsugared. As regards its plants, *Geum rivale* was to be found some years ago in its northern extremity, but of late it has disappeared.

We now come to the moorland that rises above the station: far and wide an extensive sweep of wild land stretches to the west, and among the many nooks and corners worth investigation (for *Galium cruciatum* grows here), one choice spot known as the Bury Wood tops the lot, both as regards its insect productions and its geographical position. Unguicula, Viretata, Vernaria, Undularia, Quercana, Prasinana, Derasa, Batis, Turca, Herbida, Pyramidea, are all to be found in and about it. It is worth a visit decidedly; and there is no doubt, were it better known to the "fraternity," many an "honest fly" might be picked up here.

These then are some of the results of the operations of the Hemel Hempsted Natural History Society; they are small, but the difficulties have been great.

To explain this, just one anecdote. An application had been made to a large landed proprietor for permission to botanise in his wood; after a short delay the permission was granted, accompanied with a word of advice—it would be useless, for his gamekeeper assured him "there are no flowers in the wood."

B. PIFFARD.

NOTES ON THE SCHIZOMYCETES.

IN consequence of the great interest which attaches at the present moment to the disease-producing fungi, and the probability that before long all infectious diseases will be proved to be the effect of the presence of some form of bacteria or allied species, I have thought that it would be interesting to many readers of this journal to have presented to them a list of the Schizomycetes (*i.e.* "splitting-fungi"), translated from the latest work on the subject, Dr. L. Rabenhorst's "Kryptogamen-Flora." Without further preface, I will begin with the most important genus, Micrococcus, merely remarking that I have done nothing but translate Dr. Winter's clear and excellent descriptions.

W. B. GROVE, B.A.,
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SCHIZOMYCETES.

1. MICROCOCCUS, Cohn. Cells colourless or of a pale tint, *round* or *oval-elliptic*, *motionless*, dividing in *one* direction only. The daughter-cells either soon *separate from one another*, or remain *united in a chain of two or more*, or form *Zooglœa*. Formation of the spores not certainly known.

The accepted species of Micrococcus show very little or no difference in form and size, and there remains only chemical action as a means of separating the species, which is therefore treated somewhat fully.

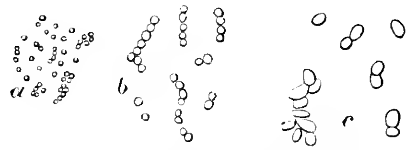


Fig. 103.—*a*, *Micrococcus vaccinæ*; *b*, *M. ureæ* (after Cohn); *c*, *M. ovatus* (after Lebert).

A.—PIGMENT-FORMING SPECIES.

1. *M. prodigiosus*, Cohn.
   Monas prodigiosa, Ehrenburg.
   Palmella prodigiosa, Mont.; Cooke, "British Freshwater Algæ," p. 12.
   Bacteridium prodigiosum, Schröter.

Cells round or oval, colourless, about $\frac{1}{2}$–1 μ* in diameter, forming at first rose-red, then blood-red, at last pallid gelatinous masses.

On nitrogenous substances, *e.g.*, on cooked potatoes, meat, wheat-bread, white of egg, starch-paste, &c.

M. prodigiosus is that organism which produces the long-known peculiar appearance, formerly designated "blood-rain," on bread, on the "host," etc. It forms at first little rose-red points and heaps, which by degrees increase to rounded bright-red spots, and afterwards become confluent to wide-spread, even dripping, blood-red patches. These consist of a red-tinted mucous mass, in which thousands of millions of micrococcus cells are embedded. These cells are themselves colourless, but they secrete the red colouring matter in the mucus. This colouring matter is very similar to fuchsin in its physical and chemical relations. It is not soluble in water, but completely so in alcohol; the solution, evaporated and again dissolved, is orange-red; the colour is changed by acids into a bright carmine, by alkalies into yellow. In the spectroscope it shows, among others, a characteristic broad absorption band in the green.

Palmella mirifica, Rabenh., can scarcely be anything different.

2. *M. luteus*, Cohn.
   Bacteridium luteum, Schröter.

Cells elliptic, somewhat larger than in *M. prodigiosus*, with highly refractive cell-contents, forming, on a solid substratum, clear yellow drops, which at first are as large as a poppy-seed, and afterwards as a half-peppercorn; at last drying up to flat shield-shaped umbilicate discs. On nourishing fluids this species forms a thick yellow skin, which becomes plaited when luxuriantly developed.

On cooked potatoes, &c.

Colouring matter insoluble in water, unchanged by sulphuric acid and alkalies.

* 1 μ (pronounced *mu*) = ·001 mm. = $\frac{1}{25000}$ of an inch.

3. *M. aurantiacus*, Cohn.
Bacteridium aurantiacum, Schröter.

Cells oval, about $1\frac{1}{2}$ μ long; on a solid substratum in orange-coloured drops and spots, which at last coalesce into equal-sized patches. On nutritive solutions it forms a golden-yellow skin.

On cooked potatoes and eggs.

Colouring matter soluble in water.

4. *M. fulvus*, Cohn.

Cells round, about $1\frac{1}{2}$ μ in diameter, at first forming rusty conical tolerably firm drops of $\frac{1}{2}$ mm. in thickness, which increase and finally present extended gelatinous masses.

On horse-dung.

5. *M. chlorinus*, Cohn.

Cells round (?), forming yellowish-green or sap-green mucous masses, or in fluids sap-green layers, which by degrees colour the whole fluid yellow-green.

On cooked eggs.

The colouring matter is soluble in water; it is not reddened by acids.

6. *M. cyaneus*, Cohn.
Bacteridium cyaneum, Schröter.

Cells elliptic; producing on slices of potato an intense blue, which penetrates also into the interior, or even to the opposite side of the slice. In fluids it forms a Zooglœa, which at first is colourless, then bluish-green, and at last intense blue.

On cooked potatoes.

The colouring matter is soluble in water; the solution is at first verdigris-green, but afterwards usually becomes clear blue. It is coloured intense carmine by acids, and then by alkalies blue or sap-green respectively. In the spectroscope it shows no absorption bands, but only a darkening of the less refractive half.

7. *M. violaceus*, Cohn.
Bacteridium violaceum, Schröter.

Cells elliptic, larger than those of *M. prodigiosus*, occurring in bright violet-coloured gelatinous drops, which unite to form larger spots, reaching 6 mm. in diameter.

On cooked potatoes.

B.—Species producing Fermentation.

8. *M. ureæ*, Cohn.

Cells round or oval, 1·25–2 μ in diameter, isolated or concatenate or forming a Zooglœa on the surface of the fluid.

In urine.

M. ureæ is the ferment of ammonia fermentation. If fresh urine is allowed to stand exposed at a sufficient temperature (30° C.), it loses its acid reaction after a few days, becomes neutral, and finally alkaline, while the phenomena of fermentation are observed. The urea disappears and is changed into carbonate of ammonia, while at the same time alkaline urates and phosphate of ammonia and magnesia are eliminated. This decomposition takes place only when the Micrococcus is developed in the fluid.

9. *M. Crepusculum* (Ehrenb.), Cohn.

Monas Crepusculum, Ehrenb. (Infusionsth.; pl. I., fig. 1).

Cells round or shortly oval, very small, scarcely 2 μ in diameter, isolated or forming a Zooglœa.

In and on various infusions and putrefying fluids.

The common form of Micrococcus, which appears in all sorts of decaying substances and in infusions, in company with *Bacterium Termo*.

10. *M. candidus*, Cohn.

On cooked potato-slices, forming snow-white points and spots.

C.—Pathologically active Species.

11. *M. Vaccinæ*, Cohn.
Microsphæra Vaccinæ, Cohn.

Cells round, $\frac{1}{2}$ to $\frac{3}{4}$ μ in diameter, isolated or united in chains and heaps of two or more, also forming a Zooglœa.

In fresh lymph from cow or human pocks, as also in the pustules of true small-pox.

According to many undoubted investigations, *M. Vaccinæ* must be regarded as the active element of vaccine lymph; it is by its means that the infectious principle is conveyed in cases of small-pox. By filtering the lymph, the solid constituents can be separated from the fluid; on using the latter for inoculation, no effect is produced, while inoculation by the former regularly excites the production of pocks. Moreover, that the Micrococci and not, as might be suggested, the lymph-cells are the effective constituents of the solid residuum, follows from the fact that lymph, which has been exposed to the air for some time, grows gradually less effective. For it begins to putrefy, and as the process of decay advances, the Micrococci disappear more and more, under the influence of the putrefactive bacteria.

12. *M. diphtheriticus*, Cohn.

Cells oval, ·3–1 μ long, single or concatenate, or forming bundles and colonies of various shapes.

On the so-called diphtheritic membranes, which are found especially on the mucous surfaces of the throat, the pharynx, the air-passages, &c., but also appear on those of the sexual and digestive organs, as well as on wounds, &c.

This Schizomycete is of extraordinarily great pathological importance. For the disease spreads itself, from the centre of its first introduction, through the lymphatic vessels and the tissue which surrounds them, into the connective tissue, the kidneys and the muscular tissue, and at last reaches even the blood-vessels, where it produces the greatest destruction. The fungi stop up the capillaries and thereby rupture them. Even the thinner bones and cartilage are destroyed by the diphtheritic processes. The consequences of the introduction of these fungi are therefore enormous.

13. *M. septicus* (Klebs), Cohn.
Microsporon septicum, Klebs.

Cells roundish, $\frac{1}{2}$ μ in diameter, united in chains or heaps, or forming a Zooglœa.

On wounds, especially in all the affections which are named pyæmia and septicæmia.

In the various suppurations and putrefactions of the body, in decomposition and poisoning of the blood, the Micrococci play an important part. Whether all the manifold phenomena are caused by *M. septicus*, or several species are not rather concerned in their production, is questionable. In wounds, even in the secretion from the fresh surfaces, we find Micrococci, which quickly multiply, produce inflammation and fever, and penetrate deeper and deeper, destroying the tissues in their course. If then they reach the blood-vessels, there arise stoppages and suppurations; the same phenomena are observed in the lungs and the liver.

14. *M. bombycis* (Béchamp), Cohn.
Microzyma bombycis, Béchamp.

Cells oval, ½ μ in diameter, single or in chains.

In the gastric juice and intestine of silk-worms, in which they produce the so-called "Schlaffsucht," a contagious disease of which the animals die in a short time.

Besides the diseases mentioned, it is probable that many others, *e.g.*, cholera, measles, scarlet fever, typhus, &c., are caused by Schizomycetous fungi.* But no trustworthy observations are yet published concerning them.

D.—DOUBTFUL SPECIES.

15. *M. griseus* (Warming).
Bacterium griseum, Warming.

Cells almost round or ovate, colourless, 2·5–4 μ long (in the act of division, 6–7 μ long), 1·8–2·5 μ thick.

In infusions of fresh and sea water.

Since according to Warming this form occurs only in a motionless state (and then forming no zooglœa), and since the cell-form answers better to that of the genus Micrococcus than to that of Bacterium, I have placed it in the former genus.

16. *M. ovatus* (Lebert).
Panhistophyton ovatum, Lebert.
Nosema bombycis, Naegeli.

Cells oval, about twice as long as broad, rounded at both ends, about 4–5, rarely 6 μ long, 2–3 (usually 2·5) μ broad, isolated or united in pairs or little heaps.

In various organs of silk-worms, their pupæ, and imagos.

It is questionable whether the described cells belong to a Schizomycete. They were first discovered by Cornalia at Milan, and named corpuscules (corposcoli); according to him they are found also, although sparingly and more by chance, in the blood of healthy silk-worms. Afterwards, these corpuscules ("corpuscules de Cornalia") were recognised as the cause of an epidemic disease of silk-worms, called "Gattine."

Since the cells in their form and motionlessness agree very well with Micrococcus, I have ranged them here.

* To which must now be added leprosy and consumption.—TR.

THE PRESERVATION OF NATURAL HISTORY SPECIMENS.

PART I.

IN these papers I intend to give practical instructions in the preservation of natural history specimens. As none can work without tools I will describe first the various preservatives and tools as used in taxidermy. As to preservatives, the one I generally use is of my own invention and is made thus:—No. 1. Whiting 1 lb., Soft soap ¾ lb., Salt of Tartar 1 oz., Camphor ½ oz., Chloride of lime ½ lb. Boil together the whiting, soft soap, chloride of lime, and tartar in 1½ pints of water; then stir in the camphor which should previously have been dissolved in spirits of wine and set aside to cool. There is another very good preservative soap invented by Mr. Montagu Browne of Leicester, which is made as follows:—No. 2. Whiting or chalk, 1½ lb., soft soap, 1 lb., chloride of lime, 2 oz. The whiting and the soft soap are to be boiled together in a pint of water, then while the mixture is still hot the chloride of lime is to be gradually stirred in.—No. 3. Browne's Preservative Powder. Pure tannin, 1 oz., camphor, 1 oz., red pepper, 1 oz., burnt alum, 8 oz. Pound and thoroughly mix, keep in stoppered bottles.—No. 4. Bécœur's Arsenical Soap. Camphor, 5 oz., salt of tartar, 2 oz., powdered arsenic, 2 lb., powdered chalk, 4 oz., white soap, 2 lb. Cut the soap into thin slices, dissolve them in some water over a gentle fire; when dissolved add the salt of tartar and chalk, take it off the fire, and add the arsenic, and lastly add the camphor which should be dissolved in spirits of wine. —No. 5. Bottling solution. Water, 2 qts., saltpetre, 2 oz., spirits of wine, 1 pt., corrosive sublimate, 1 dr., sal ammoniac, oz., glycerine, 2 oz.

Having now shown how to make the different preservatives used in taxidermy, I will proceed to describe the tools. The most indispensable tool is the knife. These are best bought at the leather-seller's, and should be about four inches long in the blade. The next article is the scissors, which should be about four inches in length. I think that it is also advisable to have another pair for severing the joints of large birds and animals, and for cutting up tow. This pair should be about seven inches in length. A strong pair of cutting pliers are indispensable for cutting the wire used in making the body. A few bradawls of different sizes will be found useful for piercing the branches on which birds are to be mounted.

Wires.—These are indispensable for forming the body of the bird, &c. I will mention a few sizes required for different birds. No. 1. Humming Birds, Wrens, &c. No. 2. Robin, Bullfinch, Sparrow, &c. No. 3. Starling, Thrush &c. No. 4. Jay, Jackdaw, &c. No. 5. Crow, Magpie, &c. No. 6. Raven, Buzzard, &c. No. 7. Pheasant, Grouse, Fox, &c. No. 8. Gannet, Goose, Swan, Badger, Northern Diver, &c.

Having been supplied with these necessities, we will now commence with the preservation of birds.

Skinning and Preserving.—Take a piece of newspaper and lay the bird on its back, take some wadding and a piece of wire, fill up the nostrils and the ears if the bird is a large one. Having done this break the bone of the wing as close to the body as possible. Next twist the legs off near the second joint. Having done this part the feathers up from the vent to the breast bone, then cut the skin with the knife beginning at the sternum or breast bone and proceeding downwards towards the vent. Now taking hold of the bird gently part away the skin until you come to the thighs, which you sever from the body (if you have not done this before). Now cut the vertebræ through at the end of the body and begin to skin carefully with the thumb and finger, keeping the feathers away from the flesh. Skin carefully over the head, and when you come to the eyes extract them. After this sever the skull from the neck, which exposes the brain, which must be scooped out with the point of the knife. Now dress the skull all over with the preservative compound, and fill up the brain-case and orbits with tow. Now dress the skin with the same and dust over with dry plaster of Paris. Clean away the meat from the tail, wings, and legs, and dress with preservative. Now insert some tow into the body, and when you have made it as nearly as possible like to it when living, sew up with needle and thread by an under stitch on the edge of the skin. The eyes, which may be got from Gardner's, 426 Oxford Street, may now be inserted. A wire, called the body-wire, should pass through the body from the tail to the head, and another up both of the legs, by which they should be fastened to branches, &c. Some taxidermists paint the gills and combs of pheasants, fowls, &c, so as to make them keep their colour. They should afterwards be varnished with copal varnish. A label should be attached to the legs, giving the scientific and common name of the bird, sex, locality and date thus :—

Sternus vulgaris.
Starling ♂.
Sheffield, 6/9/81.
J. W. W.

Sometimes a little blood gets on the wings : this may be taken off by rubbing the bird down in the way of the feathers with some common French benzoline ; afterwards dusting over with plaster of Paris, which may when dry be removed with a soft bundle of feathers.

J. W. Williams.

Wesley College, Sheffield.

LIST OF ASSISTING NATURALISTS.

Gloucestershire.

J. R. Neve, Campden. *Botany.*

Land Snails.—I know little about the land snails of my district, but, perhaps it may be interesting to other readers, as well as F. Roberts, to know I have found the following freshwater snails. Anodon (plentiful, for which he inquires). Neritina, Limpet (the lake species) ; *paludina* (larger kind) ; *Planorbis*, including *corneus*, *Limnea stagnalis* and the wide-mouthed mud snail. I shall be pleased to give further information personally.—*John Alex. Ollard, F.R.M.S., Enfield.*

AN EDITOR'S HOLIDAY IN THE ARDENNES.

A RAPID railway dash last year through the forest on my way to Switzerland by way of Brussels and Luxembourg—with momentary glimpses of bright streams and rocky cliffs—begot the desire to explore the country further. Thanks to the arrangements of the Great Eastern Railway Company, this desire was easy of fulfilment. A companion and I started from Harwich, a little after nine in the evening, in the roomy and luxurious steamer "Claude Hamilton." There was an hour and a half to spare at Brussels, which was profitably spent in the adjacent Botanical Gardens. Notwithstanding, we had reached Namur, and had started on our pedestrian journey up the valley of the Meuse for Dinant, at half-past two in the afternoon—or in about seventeen hours after leaving Harwich.

It was a charming afternoon at the end of May. The blue sky was creased with long folds of white clouds. The valley (with the exception of the winding white road) was as green as early summer herbage could make it. Nightingales warbled to each other, from both sides the river, from every copse. The majestic stream flowed smoothly and swiftly as rapids before a fall, its continuity broken every mile or so by a concave white line which proclaimed a weir. The cuckoo's "wandering voice" fell upon us from overhead. The atmosphere was softly full of those lulling but blended sounds which soothe the mind, and produce a gentle peace which passeth understanding. Noise of falling waters, swish of moving stream, cadences of summer breezes, bird-music and insect music—these are harmonic materials enough for one of nature's brightest cantatas !

This upper part of the Meuse valley seems to me like that of the Thames and one of the Derbyshire "dales" rolled into one. Almost the entire area of the country we traversed is occupied by rocks of lower Carboniferous age—the eastern end of that chain of Palæozoic rocks let down under London, and there frequently reached during deep well borings, and which crops up westerly along the Mendips.

Here in the Meuse valley we have the representatives of the Carboniferous limestone, the Yoredale shales, and the Millstone grit. Again and again we came across these three members. Their different degrees of hardness leads to a peculiar and characteristic mode of weathering. The valleys of all the Ardennes rivers traverse these rocks in all directions, and it needs little special training to see how geologically ancient all the valleys must be. That of the Meuse is strikingly so. The rocks have been upheaved at a high, sometimes even at a vertical angle, and have slowly weathered in this position. Thick beds of limestone harder than the rest have been weathered less, and now stand out in such bold relief that they form the most prominent features in the valley landscape, and have sometimes suggested legendary action for their origin, as at Roche à Bayard, two miles above Dinant, where the road passes through an opening made in such a vertical outlier.

The sandstones seem very tough, as well as hard, and these excellent qualities threaten to destroy some of the loveliest scenery in the Ardennes. Extensive quarries are opened where these strata crop up, and what was once a green valley side is converted into a rubbish heap. In the valley of the Ourthe, near Eznères and Comblain, we found these disfigurations of the landscape all the way up the valley nearly to Liège. The shales are partly metamorphosed, so that few traces of fossils are visible.

Walking along these pleasant meadows, or breaking occasionally through the copses, or keeping a keen eye to the road-side, as a naturalist should—

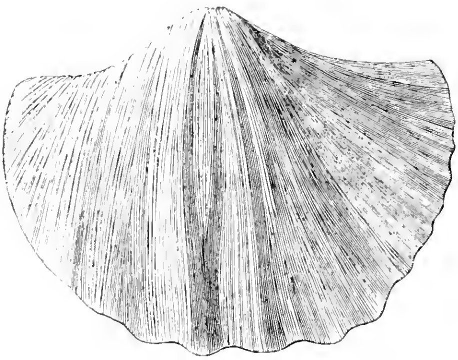


Fig. 104.—*Productus giganteus.* Lower Carboniferous formation.

everywhere one is strongly reminded of the floral identity of England with the Belgian part of the Continent. It is comparatively recently that the swampy plain now covered by the waters of the German Ocean was depressed so as to convert England into an island. If we had not received geological evidence of such a recent occurrence, there would have been more than abundant botanical and zoological reasons adducible to prove it. Everywhere are common and characteristic English flowers, insects, and birds. Now and then we come across plants and insects, which though found in Great Britain, are more numerous hereabouts. Thus on the rocks between Dave and Lustin, there grow numerous patches of that singular (and with us, rare) plant the Italian catch-fly (*Silene Italica*). The sticky stems of some of the plants, when examined with a strong lens, are in places covered with minute black insects, in every stage of decomposition. At Profondville the river makes a sudden and picturesque loop, and is temporarily imprisoned between high cliffs, whose rocks are seen to be singularly contorted. Joining the railway, at Lustin (where there is a bridge over the river) we proceed to Dinant. The rock scenery repeats itself endlessly after the patterns just given, but the picturesque effect is heightened by the steep limestone cliffs being crested with the ruins of ancient castles, which give a very Rhine-like effect. The railway station at Dinant is ordinary enough, and the Hôtel des Postes outside screens the town, cliff, and church from our view. We pass along till we come to the bridge close by, and then involuntarily and suddenly stop. On the other side of the placid but swift moving stream rises a rough surfaced, contorted, perpendicular limestone rock, to the height of three or four hundred feet, crowned with a strong citadel. Jammed up against it is the Cathedral, of Romanesque architecture, whose roof and peculiar bulbous, slate-covered spire rises above a cluster of undercut tall houses, yellow, green, and red, with numerous irregular windows and high

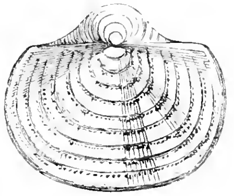


Fig. 105.—*Productus punctatus.* Lower Carboniferous formation.

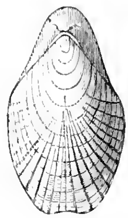


Fig. 106.—*Terebratula hastata.* Lower Carboniferous formation.

pitched bellying roofs. The charming picturesqueness of this end of Dinant is well worth a visit to see.

It was this striking transpontine view which caused us to stay at the Hôtel des Postes instead of the Hôtel d'Or. We found it was a mistake, as the bad cooking was not compensated for by the high charges. Pickled cold trout nearly as large as sardines are dear at a franc each, which is what we had to pay.

The hardship only endured for a night, however, for next morning we were early afoot. Passing through the narrow picturesque streets, along the dusty river-side road, with lovely bits of scenery at every step, we soon arrived at the much over-praised Roche à Bayard, whose origin I have already suggested. A few clusters of maiden pinks (*Dianthus deltoides*) were growing here and there in the clefts. Higher up the hill we see the wall of weathered limestone is perforated, and that the formation of another Roche à Bayard has already commenced, for this perforation will go on widening.

Through Anseremme, and at last we reach a beautiful spot where the waters of the Lesse join those of the Meuse. An ancient stone bridge over the former river adds to the picturesqueness of the scene. Trout in abundance sport in the clear green water, in evident ignorance of their hotel value. The winding Lesse strikes off on the left-hand side almost at right angles, and we follow it, past the brick pits which are worked in the clay derived from the decomposition of the shales on the long-weathered side of the hill. The roads are green and narrow, and we have to flatten ourselves against the rocks or foliage to let the quaintly-constructed country carts pass by. Tall limestone cliffs wall in the winding river and its varying margin of waving green meadows. Nowhere have we found any but English flowers in the latter, with the exception of the round-headed Rampion (*Phyteuma orbiculare*), which is very abundant and conspicuous by reason of its indigo-coloured flower-heads. In the woods on either hand *Phyteuma spicatum* and columbine (*Aquilegia vulgaris*) abound.

Our road led us to a ford, where we had to strip and cross. Then on to the famous and commanding Château de Walzin, and picturesque mill close by. The miller might be the descendant of the famous one which lived by the river Dee, so manly and independent is his bearing. He ferries us across the river, just beneath the perpendicular crag on which

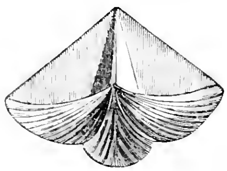


Fig. 107. — *Spirifer cuspidatus.* Lower Carboniferous formation.

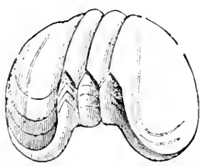


Fig. 108. — *Terebratula reniformis.*

the chateau stands, to the meadows on the other side, after telling us there is no road. But we make one for ourselves through the woods, until we gain the uneven table-land above. Then we catch sight of the wooded valley and its tributaries wandering through a forest-clad country like an irregular ditch, and the mind is satisfied with the ample proof that the entire course of this valley also is one of denudation.

Our uncertain wanderings lead us through wretched villages, each of which has a midden close to the door, whose odours are never allowed to rest by the fowls which constantly turn it over in the vain attempt to gain a living. We pass through a clearing and meet with a charcoal burner, who directs us on our way to Houyet by taking off his coat and chalking thereon a map of the route. After much ascending and descending of densely wooded slopes, and through green forest-paths, we at length strike the high road to Givet, but proceed in the opposite direction. A magnificent panorama of rolling scenery stretches before us to the distant blue horizon, patches of forests alternating with parti-coloured areas of arable lands and pastures. The rocks hereabouts are composed of soft shales, much jointed, and cleaved at every conceivable angle across the planes of stratification.

Reaching Houyet—another ammoniacal village of larger pretensions to size than usual—we make our way to a little cabaret which dignifies itself with the title of "Hôtel de Lesse." We are tired and hungry, and the kind-hearted hostess does her best to produce dish after dish to satisfy our clamorous appetites. At length there is a pause, and we decide to stay at the "Hôtel" all night. There are some lovely walks by the river side hereabout. Through the village and close to the mill, there is a small quarry where the flag-like shales are fossiliferous. But all the fossils are contorted, through their having had to partake in the movements which have produced the cleavage. All the fossils are those of our English Carboniferous limestone, including *Producta*, *Rhynconella*, *Spirifera*, *Terebratulæ*, &c. Two or three miles beyond Houyet, on the road to Rochefort, we find abundance of fossils in an uncontorted slate, the cleavage planes and stratification planes happening there to coincide.

After paying our bill (thirteen francs for dinner, beds, and breakfast, for two men!) we started early for another hot day's walk to Rochefort, through many quaint and strikingly picturesque villages.

Near Villaye-sur-Lesse, the croakings from an adjacent pond called us aside, and there we beheld hundreds of green frogs, mostly perched on the leaves of *Potamogeton*, from which they could with difficulty be distinguished. It struck me how protective the striped greenness of these frogs must be under such circumstances. Near Villaye the rocks were again fossiliferous, and I obtained some beautiful *Spirifera*.

Rochefort and its neighbourhood are famous for their "grottes,"—caverns in the limestone which have been formed like those in Derbyshire. From thence we went through Jemelles to Poix, and on through the cleared forest to St. Hubert. Here forest traditions and associations are exceedingly thick. From St. Hubert to La Roche is a walk of about twenty miles, the greater part of which lies through the loveliest forest scenery of the Ardennes. A good many patches of the forest hereabouts contain wild boars, fallow deer, and roebuck, but they are strictly preserved. Wolves have quite disappeared. The woods are chiefly of beech, and nothing could be pleasanter than their cheerful golden green glades on either hand, as seen through the forest paths. The high road is kept in splendid condition, but it is monotonously straight, and the forest seems cleaved by it as with a knife. Charcoal burning goes on with vigour in the winter, but just now they are gathering the bark, and leaving the stripped saplings to dry for more rapid transformation to charcoal.

My companion has plunged into the forest to commune with the charcoal-burners. As his stock of French is not large, and theirs is *patois*, there would be a difficulty; but he ingeniously meets this by treating them as if they were deaf, and slowly shouting forth his dictionary into their ears! The scheme is successful, and he is furnished with all the latest intelligence of the day.

Plodding along the forest high-road is not without its interest. First and foremost, to the utter disbelief of my own eyes, came sailing along a Camberwell beauty (*Vanessa Atalanta*)! It floated, balloon-like, close to the forest verge, and then disappeared like a ghost! But when I returned to seek it, it took wing from an unexpected spot with startling suddenness. I watched it for a quarter of an hour, flying up and down its beat, for it never seemed to get beyond a certain point. A pied flycatcher (*Muscicapa atricapilla*) afforded me much interest by its antics; one or two cross-bills put in an appearance near the pine-forest; jays demonstrated by their cries that they were common in the adjacent woods; tiger-beetles abounded on the hot, dry, high-road; *Calosoma* were plentiful, together with other gorgeous beetles.

La Roche lies at the bottom of a defile hollowed out by the river Ourthe. Before we reach this quiet, picturesque, little town, the road becomes rougher and descends rapidly. The old grey castle stands forth prominently, in excellent condition; the vineyards patch the hillside with their formal little rectangles. We put up at the Hôtel Meunier, and dinner, beds, and breakfast are charged to us at the enormous rate of two and a half francs each per man!

To Chalreux from La Roche is about fifteen miles, by a hillside road, which glows with reflected sun heat. The green meadows of the Ourthe look like gaudy spangles in comparison with the parched hillsides, for no rain has fallen for some time back. The villages we pass are of the usual pattern, and the country folk the same kindly, courteous creatures we have experienced all the way from Namur. They are chiefly Walloons. Their roadside chapels on the Sunday were not only filled with peasants and their wives, but the churchyard outside was occupied with bareheaded, devout listeners, who could not find room within. We join the crowd, and merge our sympathies for the moment with the feelings of those who are here seeking, if haply they may find Him!

Space fails to sketch more than the outlines of a delightful four days' journey in this lovely land. If not so full of interest to the naturalist as many parts of our own country, it has all the merit of novelty, and the change is more actually felt to a tired man. Those who desire to know more about it should read Mrs. Macquoid's charming book.

J. E. Taylor.

Early Martins.—When driving about six miles north of Truro, April 22, I saw a pair of house-martins busily engaged building a nest under the eaves of a roadside cottage. Several were circling round St. Mawes Castle.—*Henry I. Ryder, L.R.C.P.E., &c.*

NOTES ON THE NATURAL HISTORY OF JERSEY.

By Edward Lovett.

[*Continued from page* 134.]

Polybius Henslowii. Carapace about two inches across, roughly circular, smooth and showing iridescent hues. Colour salmon-pink. Legs somewhat flat, first pair larger and spiny, last pair paddle-shaped. May be taken, swimming, in nets; or in sand at very low tide.

Portunus puber. This and the six following species are swimming crabs. Their carapaces are on the same plan as that of the shore crab, with specific variations. Their first pair of legs are spiny at the wrist; the last pair are developed into paddles, and the rest are also somewhat flattened and adapted for swimming. This species is the largest, it is captured in pots and under rocks at low tide and used for food. Its carapace is velvety and of a warm brown, marked slightly with a rich bright blue. Space between the orbits finely serrated. Ova of this and the six following species very minute.

Portunus corrugatus. Carapace corrugated, anterior part serrated. Colour red varying slightly in different parts of the coast. Taken in pots in deep water, seldom used for food.

Portunus arcuatus. Carapace smooth, anterior part arched and *not* serrated. Colour brown, venetian red, or yellowish-brown. May be taken in pools, under stones and among weed at low water.

Portunus depurator. Carapace smooth, serrated anteriorly, colour brown. Taken in deep water on weedy bottom by dredge.

Portunus marmoreus. Carapace marbled, very similar to *P. depurator*, with which it is sometimes taken though rarely.

Portunus pusillus. Carapace small, rather convex. Colour brown, though it varies in this respect. Frequents stones and gravel, and may be found at low water.

Portunus longipes. Carapace broad, last spine of anterior portion long and curved. Legs long and slender. Colour brownish-red, often variegated. This rare species has been taken in pots in deep water.

Gonoplax angulata. Carapace almost rectangular, about an inch in breadth. First pair of legs remarkably long. Eyes on very long peduncles. Colour pinkish-brown or venetian red. Has been taken in sandy beds at St. Aubin's Bay, but is very rare.

Planes linnæana. Carapace roughly square, smooth, and of a brownish tint. Eyes wide apart. Legs somewhat flat. This Gulf-stream species is occasionally washed ashore here, as it frequently is on the south-west coasts of England.

Ebalia tuberosa and *Ebalia tumificata.* Nut crabs.

Carapaces roughly diamond-shaped, small, massive, and of a pinkish-brown tint. Legs round, slender; first pair broad in *tumificata* and narrow in *tuberosa*. May be obtained by dredging in deep water, particularly on weedy ground.

Thia polita. Carapace similar in appearance to a large thumb nail, fringed with hair anteriorly. Legs fold beneath carapace, somewhat slender. This species is local, and burrows in beds of shelly and stony gravel.

drical. Antennæ very long, slightly plumose. First pair of legs very long in male, short in female. Abdominal somites nearly similar in both sexes. Inhabits beds of soft sand such as the Bay of St. Aubin. Can be dredged at times.

ANOMOURA.

Dromia vulgaris. Animal nearly as round as a tennis ball, covered with dense hair of a uniform brown giving it the appearance of an Echinoderm.

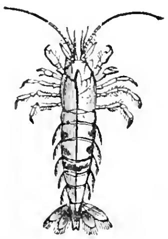


Fig. 109.—*Crangon fasciatus.*

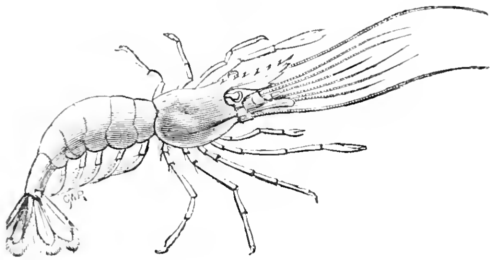


Fig. 110.—*Palæmon squilla.*

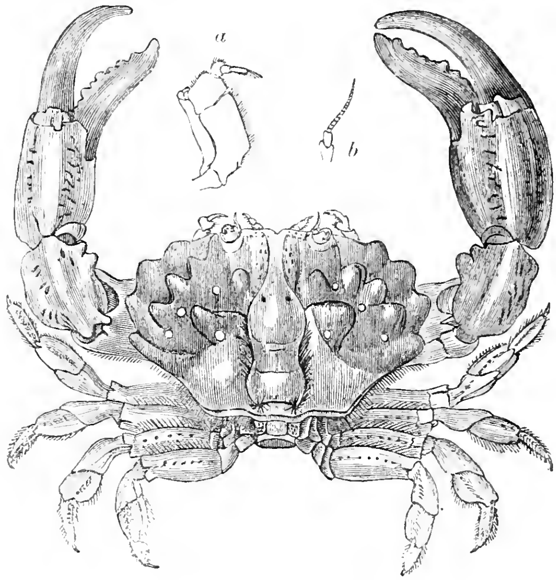


Fig. 111.—*Xantho florida.*

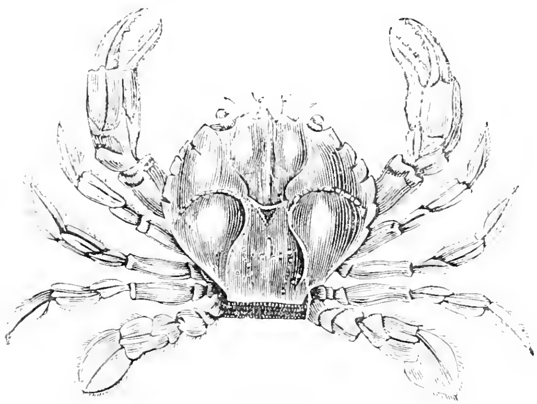


Fig. 112.—*Polybius Henslowii.*

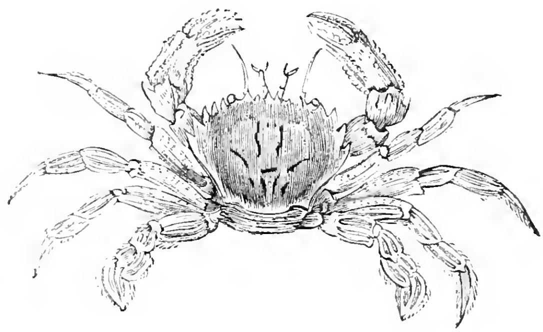


Fig. 113.—*Portunus puber.*

Atelecyclus septemdentatus. Carapace circular and fringed with hair. Antennæ plumose. First pair of legs vertically broad. Colour of animal reddish-yellow, sometimes variegated. This species is somewhat rare, and has been taken with the dredge in deep water.

Corystes cassivelaunus. Carapace approaching the MACRURA form, longer than broad, somewhat cylin-

Tips of forceps pink in colour. This species has been taken in "pots" in rather deep water.

Porcellana longicornis. Carapace red to brown, small and flat. Legs long in proportion. Antennæ very long. This minute crab clings flatly to the under side of rather smooth stones, where it may be found at low tide.

Porcellana platycheles. Somewhat larger than the foregoing. Of a dirty brown colour and hairy. First pair of legs broad and fringed with setæ. Lives under stones and rocks, usually those encrusted with other growth, hence it is difficult to detect unless it move.

Galathea strigosa. Animal lobster-shaped, but flat, fifth pair of legs being, of course, rudimentary as with all the Anomoura. Carapace corrugated, reddish-

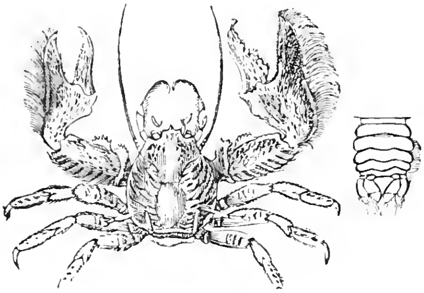


Fig. 114.—*Porcellana platycheles.*

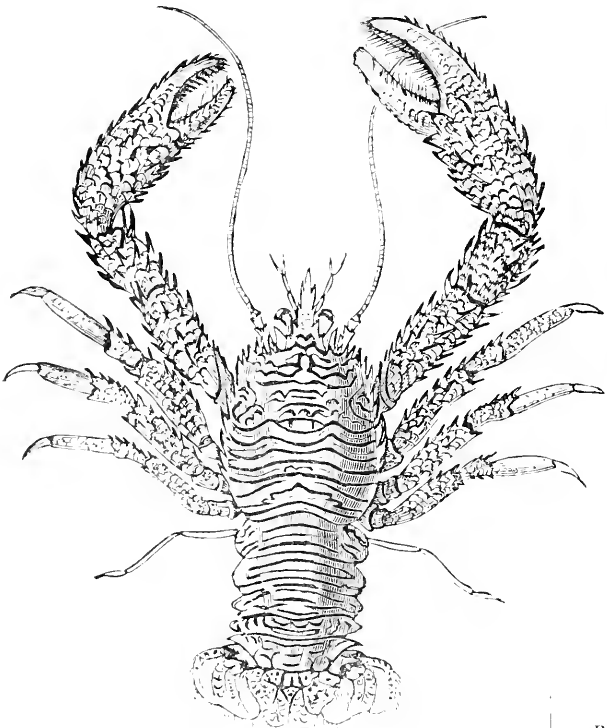


Fig. 115.—*Galathea strigosa.*

brown strikingly marked with blue. First pair of legs spiny, tail broad. Length of animal about four inches. Often taken in "pots" and is common generally.

Galathea squamifera. As above, but smaller and of a duller brown. Spines replaced by scale-shaped processes. Lives chiefly under stones, where it may be found at extreme low water.

Pagurus Bernhardus. Common hermit crab. Lives in the dead shells of molluscs. Abdominal segments soft. First pair of legs unequal in size. Common on nearly all the shores.

Pagurus Prideauxii, P. cuanensis and one or two other species have been obtained occasionally, but they are rare, and their distinguishing characteristics cannot be described briefly.

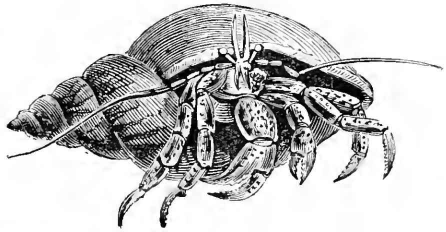


Fig. 116.—*Pagurus Bernhardus.*

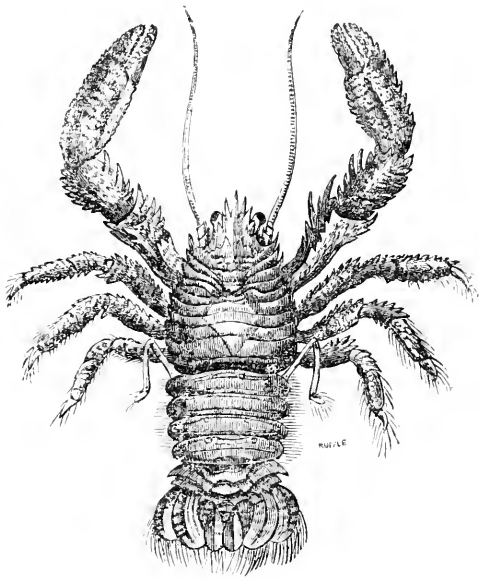


Fig. 117.—*Galathea squamifera.*

Macrura.

Palinurus quadricornis. The sea cray-fish or spiny lobster is a well-known animal as an article of food. It is chiefly taken by means of pots, in somewhat deep water on the north coast of the island.

Callianassa subterranea. Animal averaging about three inches in length, of which the abdomen, composed of rather soft segments, consists of about two-thirds. Cephalo-thorax cylindrical. First pair of legs very unequal in size. Colour pale dull yellowish-brown. Lives in deep burrows among rocky detritus, from which it can be obtained by digging at low tide.

Gebia deltura. Animal shorter and stouter than the foregoing. Cephalo-thorax spiny above. Abdominal segments hard and rather broad. Colour yellowish-red to pale brown. Inhabits deep burrows beneath beds of zostera.

Axius stirynchus. Animal generally slightly larger than *Callianassa.* Segments of abdomen arched and rigid. Tail plates broad. Claws massive. Colour pale pink, rather dull. Frequents stony ground, in which it makes long burrows from which it can be dug.

Homarus marinus. Common lobster. Description needless. This valuable article of food is taken in considerable numbers in pots in deepish water. They seem to prefer living in holes under some rocky ledge.

Crangon vulgaris. Common shrimp. Description needless. Occurs in all the sandy bays, where it is taken in the same manner as on the English shores.

Crangon fasciatus and others. There is no doubt, from what we have seen, that there are two or three other species of Crangon to be found in Jersey. They may be searched for at low tide among the gravelly pools of La Rocque, &c., and may all readily be identified by following the meaning of their specific names.

Nika edulis. This "shrimp" may be recognized by being more cylindrical than Crangon, and also as being apparently devoid of rostrum and antennæ plates. It frequents pools formed by the washing away of the zostera beds, and is generally captured at night.

Athanas nitescens. Animal usually an inch in length, stoutly formed, having large claws for so small a "shrimp." Colour warm reddish-brown, bright and shining. Frequents small gravelly pools, where it hides itself under stones.

Hippolyte sp. Several species of this interesting little crustacean occur in the rock pools amongst the algæ and zostera. They are about half an inch to an inch in length, slender and graceful in form. The third and fourth abdominal segments being vertically deeper than the rest, gives them a "humped" appearance. Their colour varies from a brilliant green to a bright umber, and as they flash through the pools in the sunshine they are a beautiful sight. The species are not easy to separate, but "captures" should be carefully labelled as to locality, &c., for future identification.

Palæmon serratus and *P. squilla.* The Prawns. These two species may be taken together in shallow shingly pools, in weedy pools, or at the margin of the rising tide on gravel where they are "foraging" for anything that has been left up dead by the last tide. Their beautifully graceful form, together with the colours shown through their transparent exoskeleton, make them well-known objects.

Scyllarus arctus. The broad lobster or Guernsey lobster. Animal four to six inches in length, massive, broad and corrugated. No forceps, but antennæ plates produced into two large flat processes similar in form to that of the common shrimp. Colour reddish-brown. This animal can swim backwards with great rapidity by means of its broad tail and powerful muscular development. Occurs in deep water and is rare.

Squilla Desmarestii. The "Mantis" shrimp. Animal about three or four inches in length, reddish-brown in colour, somewhat flattened in form. Tail notched. Forceps long and armed with comb-like processes of ivory whiteness. This remarkable crustacean inhabits deep burrows under the zostera beds.

CRUSTACEA OF JERSEY.—In Mr. Lovett's article on this subject last month, unfortunately the names of the figures of *Pirimela denticulata* and *Euryonome aspera*, female, were transposed. Readers will kindly note this correction.

A SKETCH OF THE FLORA OF THE COAL PERIOD.

By Rev. J. MAGENS MELLO, M.A., F.G.S., &c.

[*Continued from page* 126.]

THE Calamites have furrowed as well as jointed stems, but it has been said that this furrowing "may be only the result of fossilisation; that when the central pith decayed, the woody cylinder retained its original form, and the interior was filled with sand or mud, which hardening resisted the pressure of the surrounding beds more than the softened cylinder could do, and thus the now characteristic ridges would be formed on the smooth outer surface of the films of coal or other material representing the bark; the furrowed specimens being only the casts of the medullary cavity. The stem of a Calamite ended in a blunt cone, similar in internal structure to the rest of the stem, and giving off numerous rootlets, known as Pinnulariæ. Two or more plants were united at the base or arose from a common rhizome.

The leaves were produced in whorls on the radiating branches, and the beautiful fossils named Asterophyllites, Annularia, and Sphenophyllum have been thought by some writers to have been the leaves of various species of Calamites, but this is denied by Dawson, who says that the true Calamite leaf was linear, thick and angular, and was also marked transversely by rows of minute stomata as in the living Equisetum. The above-named leaves may, however, have belonged to allied plants, such as the Calamodendron and others.

Besides leaves, fruits have sometimes been found which have been shown by Mr. Carruthers to be closely allied to the fruit of the Equisetaceæ. The fossil fruit was called, before its affinities were discovered, Volkmannia. It is a small cone, differing from that of the recent horsetail in no respect save that the fossil has a protecting leaflet shielding each sporangium-bearing scale. The remains of the elaters may even sometimes be observed attached to the fossil spores.

From the Carboniferous period to the present day the Equiseta have been gradually losing both their size and importance, although perhaps multiplying in the number of species; but the large tropical forms of the early ages disappeared about the middle of the tertiary age.

A plant closely allied to the Calamites was the Calamodendron, which was, however, far more woody in its structure; but intermediate forms between Calamites and Calamodendron have been described, so both may belong to one family. The tissues of the higher Calamodendra, according to Dawson, are similar to those of gymnospermous plants; he has also considered them to form a connecting link between the Calamites and the ribbed Sigillariæ.

Lycopodiaceæ.—Amongst the commonest of the coal-measure fossils are portions of various species of a genus of plants to which the name Lepidodendron has been given; the appearance of these fossils is familiar to every one who has seen any collection of organic remains from the Carboniferous rocks. They occur in the shales and in the sandstones, and also in the substance of the coal itself, and consist of fragments of stems, sometimes cylindrical, at others, flattened and varying in thickness from an inch or two up to several feet in diameter. The surface of these stems is gracefully marked by more or less diamond-shaped leaf-scars, running spirally round the dichotomously branched stems. But not only have the stems of Lepidodendra been found, but certain cones called Lepidostrobus have proved to be the fruit-bearing organs of these plants, and fortunately for science, the internal structure of some of these cones is frequently so well preserved that its details are now perfectly recognisable; and these show very plainly that the Lepidodendra were closely allied to the existing Lycopodiaceæ, or club-mosses, but allies of a gigantic growth. The largest of the living club-mosses is a mere slender herbaceous thread of a plant, seldom exceeding six feet in length, and, with the single exception of the New Zealand species, *Lycopodium densum*, which is erect and attains a height of three feet, the entire family creeps along the ground. But the Lepidodendra and the allied forms of the coal formation grew into tall trees, occasionally attaining an altitude of as much as one hundred feet and upwards, with a diameter of ten or twelve feet. Let us now proceed to the examination of the internal structure of these plants; and as with the preceding ones we will first describe that of their allies. The existing Lycopodiaceæ have a vascular axis of spiral vessels, surrounded by a thick cortical cellular layer, forming a solid stem, upon this, simple leaves grow with a spiral arrangement, being supplied by vascular bundles; the stem branches dichotomously as does that of Lepidodendron.

A section of a Lepidodendron stem exhibits "a central pith, surrounded by a thin cylinder of scalariform woody tissue and by a large cortical layer divided into two portions, the inner consisting of large spherical thin-walled cells, the outer built up of regularly arranged elongated cells of small diameter. The vascular cylinder is penetrated by radiating meshes through which the vascular bundles passed to the leaves, which were, at any rate on the younger branches, small and lanceolate with a single mid-vein."* Let us next compare the fruits: the fruit of a Lycopodium "is produced in terminal cones composed of imbricating scales, each scale bearing on its pedicel a small sporangium full of spores. In the genus Selaginella two kinds of spores exist, the one called microspores, or male spores, producing spermatozoids, the other macrospores, or female spores, which germinate, and produce a prothallus on which pistillidia appear; these when fertilized by the spermatozoids grow into perfect plants." In Lycopodium microspores only have been seen, and the process of its germination is still unknown. There is an allied plant, the Isoetes or quill-wort, which has two kinds of spores like Selaginella, but it differs from the true club-moss in the possession of a more woody cylinder which has an exogenous mode of growth. It has already been observed that the fruit of the Lepidodendron has been found, and is called Lepidostrobus; other cones have also been met with, evidently belonging to the same order of plants, and the examination of these cones strikingly confirms their relationship to the club-mosses. They are seen to be composed of imbricating scales, spirally arranged, and bearing sporangia on their horizontal pedicels.

Three different kinds of cones belonging to this group have been described. Robert Brown many years ago described one of the cones, which he named Triplosporites. In this the large sporangia, a single one of which is borne on each scale, are seen to have a double wall, the outer composed of a compact layer of oblong cells, placed perpendicularly to the surface, whilst the inner is a delicate cellular membrane. The spores, according to this author, are each composed of three roundish sporules, but Schimper says this is an error of observation, that the spores are always united in fours, an arrangement which is proved by the tetrahedral form of the

* Carruthers.

summits, and when only three spores are seen, it is that the fourth is concealed by the others. If this is the case, then the name Tetrasporites should replace Triplosporites. It has been shown by M. Brongniart that the microspores are confined to the upper and middle part of the cone, whilst the lower portion bears simple spherical spores of a much larger size (macrospores), a similar arrangement to that which prevails in the existing Selaginellas. The macrospores (like the microspores) are also found, according to Schimper, in groups of four.

The Lepidostrobus differs from the above cone in that it contains only the microspores, but closely resembles it in the other respects.

A third kind of cone has been called Flemingites. In this each leaf-scale bears several sporangia in a double row, instead of a single one, and in these again the spores are all microspores; Schimper however doubts much whether the so-called sporangia are not macrospores. Thus we see that whilst the first described sort of cone resembles that of a Selaginella, the others are very similar to the fruit of a Lycopodium; and the only marked difference presented by the Lepidodendra when compared with the Lycopodiaceæ is that their stems are rather more highly organised, which is only what might be expected in an arborescent form; they have, as has been shown, a zone of thin walled cells surrounding the woody cylinder, and this by comparison with a similar structure found in Isoetes (quill-wort) is recognised as a true cambium layer, and the growth of the stem increased somewhat after the manner of exogenous plants. In fact Professor Williamson describes the Lepidodendra as having an imperfect exogenous structure, in which something like medullary rays are seen; the evidence, however, is by no means quite clear as yet upon this point.

Schimper has described as many as fifty-nine species of Lepidodendra, besides many plants closely related to them; amongst these is the Ulodendron, this was not dichotomous as were the Lepidodendra, but only slightly branched near the summit; its trunk also was conical, and at any rate in the fossils much fissured. The genus Knorria may be referred to the same order; in this plant the leaf-bases on the stems are very long and scale-like, and by this it may be distinguished from Lepidodendron. Halonia is another form which is characterised by tubercles, and may have been the fruit-bearing branch of a Lepidodendron or possibly of Ulodendron.

(*To be continued.*)

Red Dead-nettle.—Is it not unusual for the red dead-nettle (*Lamium purpureum*) to produce white blossoms? The other day I found a patch of this plant in which the flowers of about half were pure white. I can find no mention of this variation in any of the Floras I have.—*T. C. Royle.*

MICROSCOPY.

What is the Meaning of the Sign × ?—I can assure your correspondent E. Holmes that I do not feel in the least "confused" on the subject of my last communication; and I think if he had more carefully considered my statement he would have admitted its correctness. Let me try further to explain. I maintain that the idea of amplification alone does not cover the meaning of the sign × as used *microscopically*. I took it for granted that it would be understood that I spoke of this sign, not algebraically or mechanically, but microscopically. Now let us refer to what I take to be the standard by which the sign × is to be defined. If we turn to any optician's table giving the magnifying power of objectives—(say, e.g. Ross's) we find a $\frac{1}{10}$ and A eye-piece described as magnifying 500 diam.: I look at an object with the above power, and I see it enlarged, and having many markings clearly brought out. This I understand to represent that object perfectly as × 500 diam. If this is a correct standard, then the same object seen through Ross's one-inch and A eye-piece magnifying 50 diam., though increased in size ten times, is not × 500 diam.; inasmuch as the representation is by no means the same. But if this latter is the correct representation of an object × 500 diam. then the former is not. Hence, preferring to abide by the standard recognised by opticians and microscopists generally, I repeat the statement with which I closed my former communication, viz. that (to my mind at least) "unless there be detail corresponding with the amplitude, the object is not × so many diam." Inferior objectives of the same supposed magnifying power as Ross's $\frac{1}{10}$th will not of course define detail as clearly, but by just so much as they fail to reach the standard, they fail to × 500 diam.—*T. R. J.*

Observations on Living Organisms.—Considerable interest attaches to the continuous observation under the microscope of some of the minuter forms of rotifers and other animalcula, but there is some difficulty with very small and active organisms in the constant supply of the very limited quantity of water we can use. I should be glad to know of the means adopted by those who have been successful in the study. The film of water has to be thin to allow of the use of a high power, and limited in diameter, or the organism escapes us. I find a very fine fibre of cotton will convey too much and float the cover, and also produce currents of too great force.—*E. Holmes.*

Sections of Coal.—I should like another word on this subject, in reply to the four paragraphs in this month's Science-Gossip. Mr. Lord says his method of making coal sections is "easy and successful," but he immediately states that it is only a particular kind of coal that he has tried, and goes on to say that the matrix cannot be ground sufficiently thin to be transparent, which amounts to saying ordinary coal cannot be sectionised. The loose friable laminæ easily show vegetable remains, but then these are not sections. Mr. Walker says he has some very fine coal sections, but he has evidently only got coal "nodule sections," a very different thing. He breaks the nodule and then cuts sections of the contained fossil-wood. This is not coal. Mr. Harris has succeeded in obtaining one slide which shows structure and is a good example. I should certainly like a little more information with regard to this one. Is it transparent? Is it anything more than a section of contained fossil-wood? Mr. Griffith informs us that Professor Henfrey cut hundreds of sections in the manner referred to, but then Mr. Griffith says it is coal of a lignite character which is to be used for this process. Now the question raised is whether ordinary coal can be cut into transparent sections, not whether lignite can be so cut, and Mr. Griffith in common with the other correspondents implies that it cannot, by telling us it is a particular kind only, which I think I am justified in saying is not true coal at all. I should like to ask Mr. Griffith to withdraw this potash and acid process from the next edition of the "Micrographic Dictionary," and add to it the necessary addition that it applies to lignite instead of coal. Your correspondents fully justify my statement that transparent sections of ordinary coal cannot be made by the potash and acid or any other known process; that no such sections exist; and they add to it that they would show no structure if made, which I fully believe.—*E. Holmes.*

Cutting Sections of Coal.—Mr. C. H. Griffith has, no doubt, been still more highly amused with the continued success of the "Micrographic Dictionary's" practical joke. His "sapient student" who endeavoured to soften a nail (query, by soaking in a solution of carbonate of potash?) will no doubt be pleased to find so many other sapient individuals to keep him in countenance. As, perhaps, some of the readers of Science-Gossip may not be sapient enough to see the point of the joke, I quote the "Micrographic Dictionary"—it gives three methods of preparing coal for microscopic examination. 1. Grinding to powder; 2. Maceration; 3. "Macerating the coal for about a week in a solution of carbonate of potash, at the end of that time it is possible to cut tolerably thin sections with a razor." (Also see "Carpenter," last edition), (nothing is said about digesting with heat). Mr. Griffith now tells us that lignite, and not coal, is the material to be operated upon. The fact is, this is one of the numerous inaccuracies that disfigure an otherwise useful work. If your correspondent refers to "Entdeckung neuer pflanzlichen Gebilde in der Steinkohle und im Anthracit. P. F. Reinsch," and "Neuere Untersuchungen über die Mikrostruktur der Steinkohle des Carbon der Dyas und Trias" (by the same author), Erlangen, 1881, he will find that coal is not so devoid of interest as he imagines.—*F. Kitton.*

On the Continuous Observation of Minute Animalcula.—The animalcula on which I tried the experiment of sealing hermetically in a small quantity of water with enclosed air, are some of them alive and active at the end of five weeks.—*E. H.*

Mounting Entomostraca.—Will some of your numerous readers inform me how to mount the Entomostraca, such as Daphnia, Cyclops, Canthicamptus, Diaptomus, Cypris, &c., and in what mediums? I have consulted Carpenter, Hogg, Davis and others, but can find no directions sufficient for my purpose; even Baird says nothing upon the subject. Also I should be glad to know what would dissolve them out of their shells, so that their outer cases also may be preserved for mounting or drawing, as it is difficult to obtain the shells clean from mud, débris, and parts of the bodies. In return, I would beg to inform your readers that at a small pond in the grass-field quite close to the farm-house at Quinton Hill, Waltham Abbey, a stone's throw from the road from Waltham to Sewardstone, I found on the 5th of this month (May) quantities of the male of *Daphnia pulex*; they cannot be missed or mistaken as the superior antennæ are so different from any others of the tribe.—*R. T. Andrews.*

Micro-Tanks.—I find the best to be crystallised dishes of about seven inches diameter. They only cost about 7*d.* each, and I have kept objects in them for about twelve months. I have them on American flower-pot brackets screwed to the sides of a north window one above another.—*John Alex. Ollard, F.R.M.S., Enfield.*

The Quekett Microscopical Club.—The March number of the Journal of this club has papers on "Fluid contents in Meteorites," by Heinrich Hensoldt; "The Injection of Specimens for Microscopical Examination," by Mr. T. Charters White (president); "The Structure and Division of the Vegetable Cell," by Mr. W. H. Gilbert; and on an "Improved Compressorium," by Mr. J. D. Hardy.

Manchester Microscopical Society.—The annual Report of this society (President, Mr. Thomas Brittain, F.R.M.S.), shows a very healthy and vigorous activity. Some of the best papers read have already appeared in the "Northern Microscopist."

Hackney Microscopical Society.—The fifth annual Report of this Society is published, and contain the Address of the President, Dr. M. C. Cooke, and a capital paper by Mr. J. E. Greenhill, on "Pre-historic Hackney."

"Studies in Microscopical Science."—This serial work has improved on the first number, and promises to be one of high value to actual workers and earnest students devoted to histological research.

DISTRIBUTION OF THE DIATOMACEÆ.—A paper on this subject, read before the Whitehaven Scientific Association, by Mr. B. Taylor, is an excellent example of what can be done by painstaking research. The gatherings tabulated have been made at different times during several years past within a radius of about five miles from Whitehaven. The locality where every species was found is given, and six closely printed pages are filled with Mr. Taylor's lists.

ZOOLOGY.

LOCAL NAMES.—The following is a list of names now, or lately in use in the vicinity of Whitby, Yorkshire. "Catswerril," squirrel (*Sciurus vulgaris*); "Moudiwarp," mole (*Talpa Europæa*); "Ratten," common rat (*Mus rattus*); "Rizzle," weasel (*Mustela vulgaris*); "Billybiter," blue titmouse (*Parus cæruleus*); "Bullspink," bullfinch (*Pyrrhula vulgaris*); "Collier," swift (*Cypselus apus*); "Cooscot," or "cushat," ringdove (*Columba palumbus*); "Crake" or "Cruke," rook (*Corvus frugilegus*); "Cuddey," hedge-sparrow (*Accentor modularis*); "Dowp," carrion crow (*Corvus corone*); "Glead," kite (*Milvus vulgaris*); "Gowk," cuckoo (*Cuculus canorus*); "Herring-sue," common heron (*Ardea cinerea*); "Lairock," skylark (*Alauda arvensis*); "Nanpie," or "Pyet," magpie (*Pica caudata*); "Teeafit," lapwing (*Vanellus cristatus*); "Ask," common newt (*Lissotriton punctatus*); "Hagworm," common snake (*Tropidonotus natrix*); "Cuvvins," periwinkles (*Turbo littoreus*); "Flithers," limpets (*Patella*); "Brock," the cuckoo-spit insect (*Cicada spumaria*); "Buer". or "Buver," gnat (*Culex pipiens*); "Bum'ler" or "Bumblebee," humble bee (*Bombus terrestris*); "Cow-lady," "Ladyclock," or "Judy-cow," lady-bird (*Coccinella*); "Forkin Robin" or "Twitchbell," common earwig (*Forficula auricularia*).—*J. P. Dotchon.*

LIMAX MAXIMUS KILLED BY EATING STARCH.—A slug of this species was found in a basin of dried starch, which had been used for laundry purposes. That it had eaten very freely, was evident from the marks left upon the surface. These marks were so sharply defined that the number and form of the denticules of the animal's jaw might have been predicated from them. For the next three days the slug remained inert and apparently exhausted in the basin, during which time it voided 68 cylindrical ovate pellets of a French-grey colour, about 4½mm. long and 2½ broad. Having read that the observations of Nägeli go to prove that prolonged treatment with saliva will remove from starch the substance coloured blue by iodine, I was curious to know whether the simple acts of mastication and deglutition were sufficient to produce this effect, for slugs as well as snails are provided (for their size) with an enormous pair of salivary glands, so large indeed that were those of man in the same proportion we should have them a foot long. Accordingly I submitted some of these fæcal pellets to an analyst. His report, however, was that a solution yielded the usual blue when treated with iodine, and in as marked a degree as pure starch does, and that the material apparently consisted of starch which had undergone no change in passing through the alimentary canal. On the morning of the fourth day, I found the slug dead.—*C. Ashford.*

TINGIS HYSTRICELLUS.—Just thirteen years ago (April 1869) there appeared in SCIENCE-GOSSIP, vol. v. p. 84, a description of a new Tingis, by Mr. H. C. Richter, who named it *Tingis hystricellus*. The insect was discovered by me about the year 1868 on the Bringall plant, and was more or less abundant till toward the close of the year 1871, when it suddenly disappeared and was no more seen until about the middle of the present month, although diligently and persistingly searched for year after year by myself and my head servant, who takes an interest in such work. About a fortnight ago, while collecting another species of Tingis from a lily leaf in our kitchen garden, a *Tingis hystricellus* imprudently alighted upon the sleeve of my coat, which at once led to the examination of the Bringall plants in the garden, and I soon discovered that our long lost friend had reappeared in great force. Since then I have collected a considerable number, which I intend to forward to my friend Mr. Thomas Curties, of High Holborn. They have been killed by immersion in hot water, and antennæ and legs arranged in proper order with a small hair pencil. This work, although very tedious, was not difficult, for most of the insects died with outspread legs and extended antennæ. Each was examined under a lens. I am induced to make this communication to you as I am occasionally asked by readers of SCIENCE-GOSSIP for specimens of the insect, which I have hitherto been unable to supply. It is curious that these insects should have disappeared for such a length of time and then have suddenly reappeared. Our search for them was not alone confined to our immediate neighbourhood. Distant vegetable gardens were also examined, and I cannot find that they have been met with in other parts of the island.—*S. Green.*

CARDIFF NATURALISTS' SOCIETY.—The report of Transactions for 1881, includes some excellent papers, especially the Address of the President (Mr. G. E. Robinson); "A Walk in the Country," by Dr. Vachell; "Glacial Actions in the neighbourhood of Cardiff," by Mr. T. W. Edgeworth David, and a capital and full Meteorological Report for 1881, by Mr. F. G. Evans.

"THE BUTTERFLIES OF EUROPE."—By Dr. H. C. Lang, F.L.S. (London, L. Reeve and Co.) We have received Part viii. of this beautiful work; the plates keep up their high artistic character.

North Staffordshire Naturalists' Field Club.—(President, Mr. W. Challinor; Hon. Sec., Rev. T. W. Daltry.) The sixteenth Report of this society has just appeared, containing lengthy abstracts of papers read last year, and of the places visited during the excursions. The society devotes a large share of its attention to archæology. Chief among the papers are those of Mr. Clement L. Wragge, relating to Meteorological and Phenological observations, and of Dr. McAldowie, Mr. Robert Garner, and Mr. F. M. Sexton.

The Electric Light at Norwich is a great attraction to moths, especially the lamps in the Market Place, as they are much higher than the others and light up the castle hill which is covered with trees and bushes. This year there have been a large number taken at these lamps. In one week (May 9–16, 1882) I collected the following specimens 1 *Smerinthus populi*; 1 *Smerinthus tiliæ*; 1 *Sphinx ligustri*; 15 *Cerura vinula*; 1 *Dicranura furcula*; 2 *Pygæra bucephala*, and hosts of others more common. *Papilio machaon* are out, and very plentiful on the marshes.—*E. P. Dyball.*

Embryology of the Podophthalmata. — A pamphlet on this subject, by Mr. Edward Lovett (Croydon "Advertiser" Office). It gives a series of careful observations on the ova of several species, and is of great value to all students of embryology. Mr. Lovett thinks that some species may be double brooded.

Provincial Scientific Societies.—Mr. H. G. Fordham, F.G.S., Odsey Grange, Royston, has issued circulars to all the scientific societies throughout the kingdom with which he was acquainted, inviting them to send delegates to the forthcoming meeting of the British Association at Southampton, when the second conference of scientific societies will be held for the purpose of recommending objects of local research, &c. Secretaries who have not received these circulars should communicate with Mr. Fordham at the above address.

The Kelvin Grove Museum.—Every lover of natural history who has visited Glasgow will be sure to have paid a visit to the above museum, and admired its arrangements. We are glad to see, from the report for 1881, that it has continued to grow in resources and public interest and attraction.

Walthamstow Natural History Society.—We are pleased to see this recently founded society in a flourishing state, as indicated by its report just issued. It now numbers sixty-six members, and last season had four original papers read. The President is Mr. David Howard, F.C.S., and the Hon. Sec. Mr. O. C. Goldthwait.

Entomology.—Professor Riley's monthly contributions to the "American Naturalist" are among the most important of the new and improved features of that well-known journal. They deal chiefly with practical economical entomology.

In Memoriam.—The "American Naturalist" has issued a special evolution number in honour of our deceased naturalist, Dr. Darwin.'

Hampstead Naturalists' Club.—The second annual Report, issued last April, shows that eleven papers were read last session, and six special excursions made. President, Mr. Wm. Boulting, L.R.C.P.; Hon. Sec., F. L. Watkins.

East Kent Natural History Society.—The twenty-fourth Report of this old-established society gives an outline of the work done, together with abstracts of the papers read last year. President, Capt. McDakin; Hon. Sec., Mr. G. H. Nelson, M.A.; Assistant Sec., Mr. James Fullagar.

BOTANY.

Notes on the Ferns of Killarney.—But not on the Killarney fern (*Trichomanes radicans*), for I regret to say its place knoweth it no more. Many a hunt had I during my six months' stay, and many a consultation with woodmen, gamekeepers, and others, all of whom know every inch of Turk, but one and all assure me it has completely disappeared. Why will tourists persist in carrying off these "fairy tokens," which Kingsley tells us were left for "wise men and good children." And yet as if to punish visitors for depriving their land of its peculiar treasure, bare-legged Irish laddies often succeed in foisting upon strangers *Hymenophyllum Tunbridgense* for the "rale Killarney fern." I myself saw an instance of this at Looscannagh, and judging by the "number of hands employed," should imagine they drive a pretty brisk trade. So far as my own observation extended, I should not say Killarney possesses many very rare ferns. It may be as well to add that the species enumerated were all found either on the peninsula, which divides the middle and lower lakes, or on the neighbouring mountains on the south side of the Turk lake. The more common ferns are extremely abundant; such are *Polypodium vulgare*, *Lastrea filix-mas*, *Asplenium ruta-muraria*, *Asplenium trichomanes*, *Polystichum angulare*, *Scolopendrium vulgare*, *Blechnum spicant* and *Pteris aquilina*. Less common, but still fairly abundant, are *Asplenium adiantum-nigrum*, *Ceterach officinarum*, and *Lastrea thelypteris*. The Lastreas are well represented, in addition to the two just mentioned. *L. dilatata* and another Lastrea not unlike *L. dilatata collina*, also *Lastrea fœnisecii* are exceedingly abundant. This last is particularly luxuriant in the recesses of the woods, where it grows in large clumps; as everybody knows, Killarney is the headquarters of *Osmunda regalis*. Well might

Sir Walter Scott exclaim, "*This* is worth coming to see." Here, growing to the height of a man, there bending gracefully over the water's edge, Osmunda holds his royal court. And yet he is the first to succumb to the early frosts, and in autumn presents a sad contrast to his former self as he shrinks, pale and withered, before the advancing stride of winter. In one or two places in the Muckross woods, I found *Ophioglossum vulgatum*, but it cannot be said to be common. *Polypodium phegopteris* is also a rarity at Killarney, and I am indebted to the courtesy of the Rev. I. Brougham, who kindly informed me where it could be found. I shall ever remember the pleasure I felt on first seeing its pale green fronds glistening with the spray from a waterfall which came dashing and foaming through a deep gorge near the Turk cascade. The variety of Athyrium known as *A. latifolium* is common. The characteristic ferns of Killarney are the Hymenophyllums. It is extraordinary in what abundance *H. Tunbridgense* grows. Like *P. phegopteris*, this fern thrives best near falling water, but it seems to find lodgment in almost every little watercourse. Long matted tufts, yards in length, may be pulled from the face of the bare rock, where no other plants could possibly grow. *H. Wilsoni* is not so common, and seems to prefer the branches of decayed trees. I have before mentioned *Adiantum nigrum*—on one or two occasions I found bifurcated specimens of this fern, and the variety called *acutum* is by no means rare. Why is this form recognised as a variety? So far as I can judge, the peculiar elongation assumed is caused by the situation of its growth: wherever found, it was always in the crack or fissure of some rock, and hence I infer that the branches and leaflets simply become pointed in their search for light. I was told that *Polystichum lonchitis* grew on the mountains, but I never succeeded in finding it either on Turk or Mangerton. How delightfully simple must the classification of ferns have been to the Kerrymen of the past, judging from an old Flora I saw at Muckross Abbey. This book mentions about eleven species as found in the neighbourhood, but out of these four are Adiantums, three Filices, two Trichomanes; the other two are called Miltwast and *Phyllitis multifida*. I should like to give the extract *in extenso*, but I fear these notes would be too lengthy. I am quite unable, however, to identify those mentioned. What fern is meant by *Adiantum album crispum alpinum*, and again, *Adiantum nigrum pinnulis Cicutariæ divisum*? And among the Filices are found *Filix montana ramosa minor argente denticulata*, *Filix saxatilis caule tenui fragili*. I may have a word or two at some future time on the flowers of Killarney, if agreeable to your readers.—*John Rasor*.

Botanical Atlas.—By Mr. D. M'Alpine, F.C.S., (Edinburgh, W. & A. K. Johnston), Part I. This is a very acceptable work to a botanical student, giving detailed coloured diagrams of all the reproductive organs of plants, selected on account of their representative character.

"Natural Selection incompatible with Atheism."—By John Gibbs. (Chelmsford, John Dutton, price 6*d.*) This is an exceedingly well-written and ably-reasoned pamphlet, directed chiefly against "the errors of Dr. Aveling." The author demonstrates that the new philosophy of flowers, as formulated by Darwin, does not in any way favour the views of atheism.

Peculiar Cucumber.—The cucumber referred to by Mr. G. H. Payne, as having a leaf projecting from the side of it, is probably an instance of the not very uncommon adhesion of a fruit to an adjoining leaf-stalk. The cucumber would show on examination some ridge or mark indicating the position of the leaf stalk.—*F. T. Mott, Leicester.*

Malformation of Daisy.—The case mentioned by E. G. H. of two divisions united on a stalk which was partially split, is an example of synanthy, or the cohesion of flowers, affecting in this case not two single flowers, but two compound inflorescences. It is frequent in the dandelion, and in many other plants. The best work to refer to for all questions about malformations in plants is Dr. Masters' "Vegetable Teratology," published for the Ray Society in 1869.—*F. T. Mott, Leicester.*

The red-blossomed Hawthorn.—It is related that this handsome garden shrub is a variety of the common hedge plant of no greater antiquity than the days of Ray; and my authority adds, it is somewhat remarkable that all the red-blossomed hawthorns have not been propagated from the same tree, but, that several red-blossomed seedlings have been found at different times and at various places. The important question arises then, at what times and places have these seedlings been found? For example, I saw a moment ago over a neighbour's wall, a red garden thorn, with one single twig of snowy May blossom on it; and yesterday when walking out on the road to Albury, over against St. Martha's Hill, I came on a long hedge of wild quickset quite dappled with pink blossoms. The hedge lay exposed to the blight of the late disastrous south-wester, and I have questioned can this metamorphosis be the effect of wind and wet? It would be of interest to set cuttings of these strange shoots in the ground, and to notice whether the new plants had white or pink blossoms, as by that means we might perchance learn something further regarding the influence of the seasons on variation and the production of races.—*A. H. Swinton, Guildford.*

Preserving Crustacea.—I should be much obliged if any of your readers could inform me how to preserve Crustacea, so as to keep the natural colour.—*T. D.*

GEOLOGY.

The Museum of the York Philosophical Society.—An excellent little handbook to this well-known museum has just been written by the curator, Mr. Walter Keeping, F.G.S The part relating to the collection of Yorkshire fossils is a good example of how local fossils should be arranged and popularly described. Within the last three years the above museum has been increased by over 110,000 geological specimens, purchased and collected by Mr. W. Reed, F.G.S., including his own collection and that of Mr. Edward Wood, F.G.S., of Richmond.

Glacial action in North Wales. — Any geologist passing during the approaching holiday season from Beddgelert or Llyn Cwellyn to Nantlle, in descending into the comparatively little known but fine pass of Drws y Coed, may observe a large rock surface on the left-hand side of the road, recently laid bare, close to the road-side and near to the first water wheel at the Copper Mine, which is well grooved and largely striated, with the appearance of having been planed over, in the direction of the pass, which the ice must have taken in being forced down from the rugged and highly precipitous heights of Mynydd Mawr on the one hand, and Mynydd Drws y Coed on the other. Near here I found some very definitely scratched pieces of loose slate and other rocks, picked out of the ancient mountain side quite recently broken into for road repairs. I may add that at the mine in the pass some interesting specimens of copper ore and quartz crystallisation may be obtained, while the scenery of the spot is remarkably bold.—*Horace Pearce, F.G.S., Stourbridge.*

"Missing Links" again.—This time the found "Missing Link" is a mammal from the upper eocene of France, from the phosphorite deposits, called Cebochœrus, intermediate between pigs and monkeys. A complete head and lower jaw united of this animal has been found, and exhibited before the Paris Academy of Sciences.

Ballarat.— The School of Science at Ballarat has just issued its annual Report, containing a sketch of the work done, and the discoveries made in Australia during the past year. It is accompanied with diagrams, &c.

Erratum.—Page 129, fig. 93, June No. Science-Gossip, *Polypora polyporata* wrongly given in place of *Glauconome bipinnata.—C. Parkinson.*

Polyzoa from Halkyn Mountains.—May I offer a correction in the naming of the Polyzoa from Halkyn Mountains in Mr. Parkinson's paper. Figs. 92 and 93 are evidently distinct as to genus, and both are named *Polypora polyporata*—a species, so far as I am aware, has not been found there. I would suggest the following naming: fig. 89, *Glauconome elegans*, Young; fig. 92, *Polypora tuberculata*, Prout; fig. 93, *Glauconome flexicarinata*, Young. The rest are correctly named.—*Geo. W. Shrubsole.*

NOTES AND QUERIES.

Local Names.—I have often been amused to hear the quaint odd names given to many natural objects in this locality. A difference of a few miles will give a new designation to some common species. Often I have stopped a group of lads, and asked them what they called such-and-such a bird, or insect, or plant, and the information, given in the broad Lancashire vernacular, has often made me laugh heartily. One would know of nests of "spadger," house sparrow; "sheppie," or "utick,"—starling and whinchat. Another would have been to the brook catching "nine-'een," the lampern; or "cod-heads,"—the miller's-thumb; or "beardies," the loach (*Cobitis barbatula*); or "menners," sticklebacks (*Gasterosteus*), the males and females of which are designated respectively, "cocks" and "hens." The willow wren (*S. trochilus*), chiffchaff (*S. hippolais*), and whitethroats (*C. cinerea* and *sylviella*), are commonly called "peggies." The ring ousel (*T. torquatus*) is "fell-ousel;" the fieldfare, "blue-back;" and the tits (*Parus*) are all lumped together as "nopes." The water rail (*R. aquaticus*) is called "scaragrice"—a name which is also often used here to denote anything very wild or timorous. The barn owl is called "hullet;" the bulfinch, "thickbill;" the greenfinch, "greenbull;" and the sandpiper (*T. hypoleuca*), "willy-wicket," or "sand-pie." The reed-bunting (*E. schœniclus*) is "black-cap," or "black-headed bodkin;" and the sedge warbler (*S. phragmitis*), "chitter-hi-ti," or "old fella." Stonechats (*S. rubicola*) and wheatears (*S. œnanthe*) are "chappers;" and the grasshopper warbler (*S. locustella*), "huzzer." The linnet (*L. cannabina*) is called "paywee;" the black-headed gull (*L. ridibundus*), "petch;" and the common gull (*L. canus*), "sea-gorr." Tadpoles are "bullheads;" and newts, "asks;" and the blind-worm (*A. fragilis*), "langworm." As is pretty generally the case everywhere, the blindworm and newts are looked upon by the country folks here as highly "venomous." Large moths, especially the *Sphingidæ*, *Maura*, &c., are called "bussarts," and are "unlucky." Large beetles, of any kind, are "thunder-clocks;" dragon-flies, "stangin (stinging) hazzerts;" and spiders, "hattercrops." Shells of *Helix* &c. are "snailhorns." The fruit of the dog violet (*V. canina*) is called "butter-pats" by the country children, from its resemblance to the half-pounds in which butter is made up for market in this locality. *Cardamine pratensis* is called "Mayflower;" *Orchis mascula*, "crowfoot;" *Geranium lucidum*, "bachelor's buttons;" wood sorrel (*Oxalis acetosella*), "bread and cheese;" and the hemlock (*Conium maculatum*), "kewse," or "kex." *Vicia ornithopus* and *Alchemilla vulgaris* are called "lamb's foot;" and the horsetails (*Equisetum*) are known generally as "toadpipes." The yellow rattle (*Rhinanthus crista-galli*) is "pennygrass;" and the *Solanum dulcamara*, "robin-run-ith-hedge." The fruit of the sloe is called "slath," and a conserve of it is in high repute amongst the country people as an astringent medicine. The yellow flag (*Iris*) is called "daggers;" the large leaves of the coltsfoot "flapper-docks;" *Ranunculus repens*, "catclaws;" the seed heads of dandelion, "one-o'clocks;" and the great ox-eye daisy, "caten-aroes." I think many of the local names I have mentioned are peculiar to this district, and I hope the list will interest those of your readers who give their attention to this subject.—*R. Standen, Goosnargh, Preston, Lancs.*

LOCAL NAMES EXTANT IN RURAL OXFORDSHIRE.—"Bald coot,"—the common coot (*Fulica atra*); "dog tree," the dogwood (*Cornus sanguinea*); "feather," the horse-tail; "five-leaved grass," the fritillary (*Fritillaria meleagris*); "gentlemen and ladies," the common arum (*Arum maculatum*); "goosey ganders," the early purple orchis (*Orchis mascula*); "golden chain" the laburnum; "golden knobs," buttercups; "harvest throw," the shrew (*Sorex vulgaris*); "hipson," the fruit of the wild rose (*Rosa canina*); "honey bind," the honeysuckle; "humming fly," the hoverer fly (*Eristalis tenax*); "jack blay," the bleak (*Cyprinus alburnus*); "Jenny bunt tail," the will o' the wisp; "Jenny fuddler," the wren (*Troglodytes vulgaris*); "land drake," the land rail (*Crex pratensis*); "lockchest," the wood louse (*Oniscus asellus*); "molly horn," the heron (*Ardea cinerea*); "moon," the white ox-eye (*Chrysanthemum leucanthemum*); "Norman thrush," the missel thrush (*Turdus viscivorus*); "packman," the spotted snail (*Helix aspersa*); "pigweed," the cow parsnip (*Heracleum sphondylium*); "pug-fist," puff-ball; "purses," freshwater mussels (*Unio tumidus*); "sill-green," the house leek (*Sempervivum tectorum*); "snake's flower," the white campion (*Lychnis vespertina*); "silver feather," silverweed (*Potentilla anserina*); "toad's cheeses," rank fungi.—*W. H. Warner, Standlake.*

TURNSTONE.—The reason of my inserting a query respecting this bird in the December number of SCIENCE-GOSSIP was to elicit proof from others of so extraordinary a circumstance as that two birds about the weight of a common quail could turn over a fish of the size mentioned by Mr. Edward. A friend of mine, a naturalist, who has large experience of British birds, extending over three-quarters of a century, tells me he has never heard of or seen a turnstone scraping or turning over anything so weighty, and difficult to move. As regarding my good taste which Mr. Laver animadverts on, I think all will agree that SCIENCE-GOSSIP is written for sifting the truth of statements and not taking them for granted, although they have come from a *savant.*—*S. A. Brenan, Clerk, Allan Rock, co. Tyrone.*

LATE TADPOLES.—In connection with the interesting fact mentioned by W. B. R., I may say that in March last year I gathered a quantity of frog spawn which produced a good stock of tadpoles. These I fed on watercresses, and managed to develop them all into frogs except one which remained in the tadpole state until January this year, when, taking it out to put under the microscope I unfortunately lost it. It retained the branchiæ till October or November, but after that I could not distinguish them, though it must have had them in some measure, for it very rarely came to the surface to breathe. I mean to try the rearing experiment again this year, and should be very glad if any correspondent could let me know how to keep the young frogs alive after they leave the tadpole stage. They have invariably died with me, the longest period I have been able to keep one being eight days.—*G. R. R.*

PHOSPHORESCENT CENTIPEDE.—The scolopendrum has long been known to be phosphorescent in a slight degree, but nothing I have read equals that referred to in L. M. D'Albertis's "New Guinea," published in 1880, in which he says, "I observed a centipede (Scolopendrum) running along a wet rope. It attracted my attention by the phosphorescent light it threw out and left behind it. I tried to catch the poor little animal, but scarcely had I touched it with a pair of pincers than it threw out a quantity of phosphorus, which besides shining on the rope, fell on the table beneath, illuminating everything with its yellow light, and for some minutes I could gather up phosphorescent matter with the pincers." Vol. ii. p. 94. I think such a remarkable instance of animal phosphorescence worthy record in the more widely read pages of the SCIENCE-GOSSIP Magazine.—*W. Budden, Ipswich.*

BURROWING CATERPILLAR.—A caterpillar was brought to me on February 8th, and I was told that its habit was to burrow in the earth during the day and come up in the night to eat the polyanthuses, both leaves and blossoms, but evidently preferring the latter. It was not a single specimen, as there were many other similar larvæ following the same course at the time. The grub was about $1\frac{1}{4}$ inches long, a good deal scattered in form; in colour, dark bottle-green, with distinct black markings, the legs very short and thin, and the under part of the body, a slight reddish-brown. It had no horn or other protuberance, and no hair. I placed it in a pan half full of earth, and for the next five days it got down each day into the earth wholly out of sight, returning to the surface at about 8 or 9 P.M. eating the primroses that I had placed for it there. On the sixth day it went down and did not come up at night, and I conclude is now undergoing its change to the pupa state. I shall be glad if any one can give me information as to what species this animal belongs.

CATALOGUE OF WEST KENT FLORA.—In an article on "Silent Science Workers," the *Standard* says that the West Kent Natural History Microscopical and Photographic Society has catalogued the plants of this district. Can any one tell me where I can get this catalogue? I should also be glad to hear a little more about the Society.—*C. Fredlborters, Grafton House, Forest Hill, Kent.*

BLOOD CORPUSCLES.—Dr. Carpenter in "The Microscope" says that "the red blood corpuscles present in every instance the form of a flattened disk, which is circular in man and most mammalia, but is oval in birds, reptiles, and fishes, as also in a few mammalia (all belonging to the camel tribe)." Could any of your readers suggest what difference it makes to an animal whether its blood have circular or oval red corpuscles, and why the camel should differ from the other mammalia in this respect?—*E. Parry, Roehampton.*

ACHERONTIA ATROPOS.—It is not unusual for *Acherontia Atropos* to remain in the pupa state throughout the winter, and emerge the following summer, but collectors, I believe, as a rule, find it rather difficult to get imagines from such pupæ, as the moths, though oftentimes perfectly formed, from some reason or other, seem to have no power to burst the pupa-case. Having been somewhat successful in rearing this insect, I will give a few particulars which may be of service to your correspondent J. Wilburn. During August and September of 1877, I had in my possession a dozen larvæ, which were found feeding upon potato leaves. For these I very carefully prepared some very finely sifted earth in flower-pots, into which they entered with the exception of two, which changed into pupæ on the surface. One of these produced a very fine moth in November. I had often read of the power of squeaking in this insect, but although from time to time several specimens had passed into my hands, I had never detected the least sound, and began almost to doubt the veracity of the statement. However all my doubts were then set at rest, for the moth in question was an excessively noisy insect, and squeaked loudly, and not alone in the perfect state, but in all the stages of larva, pupa, and imago. No more moths emerged that winter, notwithstanding the breeding-cage was kept in a warm kitchen. In April of next year I determined to see the condition of my pupæ. It was a fortunate resolution, as the earth which I had been at such pains to sift had become hard as any turnpike road. One moth had indeed come out of the pupa, only to perish miserably, being quite unable to force its way through the mould. Two of the pupæ I found were dead. It is generally easy to discern whether any vitality exists in pupæ or not by their colour, which changes in defunct specimens to a dull black. The rest I took up and laid in damp moss and still kept before the kitchen fire. The June of 1878 was exceedingly hot, and thinking it would be better for the pupæ to be subjected to solar, rather than to artificial heat, I carried the cage into the greenhouse. A few days after, viz. on the 18th, I was delighted to see that a fine male had emerged, and on the 23rd another male came out. The next day a large female made her appearance, on the 25th another male, on the 28th another male, and on the 29th likewise. The temperature then became very low, and it was not till July 5th that my eighth and last specimen emerged. I may remark that they all, with, I believe, one exception, came out between 6 and 8 o'clock in the evening, and just after they had been treated to a shower-bath. All of them were loud squeakers. My advice then to Mr. Wilburn would be to deposit his pupæ in moss, which, as soon as we get hot weather, should be kept damp, though well drained, and either place them in a warm room, or better still in a greenhouse, as I did with mine; and I hope at the proper season he will have the pleasure of seeing the imagines developed in perfect condition.—*Joseph Anderson, jun., Chichester.*

Wagtails.—In reply to the query of W. R. T., I can say that the wagtail was in search of flies and insects, which are very apt to creep for winter quarters in the cracks between the window and masonry, or else it saw flies against the dark window and in snatching at them flew against the window. All this winter a gray wagtail has considerably annoyed us by continually dashing at the glass, using the clothes line as its watching "post." Nothing would drive it away, and I am quite at a loss to understand its action, unless it is that it saw gnats &c., against the dark shade of the window. I watched it repeatedly, and am quite sure there were no flies either inside or outside on the glass. Perhaps some other correspondents can throw some light upon it. I have known robins and tits cling for some minutes to the woodwork and peck at the cracks.—*Edward E. Evans.*

Redstart (*Phœnicura ruticilla*).—I saw yesterday (April 3rd) a female specimen of this bird perched on a pump a few yards off from where I was standing, and uttering its feeble call-notes. Is not this a remarkably early appearance? I have seldom seen the redstart till the middle or end of the month. This is the first emigrant I have yet seen.—*W. H. Warner, Standlake, Witney.*

Earth Worms in a Garden Path.—May be got rid of in the following manner; take ¼ pound of good chloride of lime and mix it with two gallons of water. Now after rain, well water the paths, and the worms will come to the surface, and can be picked up and made away with. Do not water your flowers with it, or you might kill them.—*Albert Smith, Islington.*

Tadpoles were "all alive" in this neighbourhood, Kingstown, co. Dublin, by the end of February, and I found *Hydra vulgaris* and *viridis* at the commencement of the month. The chiff-chaff was heard early in February, and on April 1st I had the unexpected pleasure of watching a humming-bird hawk-moth (*Macroglossa stellatarum*) in my garden. Is not the latter a remarkable visit at this season of the year? Of remarkably early wild flowers we had quite a garland.—*James Bowker, F.R.G.S.I.*

Mites in Entomological Collections.—Carbolic acid is an excellent thing for preventing mites, well rub it into the woodwork, also creosote.—*Albert Smith.*

Snails and Hydras.—On 21st January last, I found in the canal and in a pond near to it *Hydra vulgaris*, *fusca*, *viridis*, and put them in my aquarium. They multiplied, and last Sunday made quite a show. I noticed a slight green formation on the glass inside, and resolved to put more snails in (a number of small planorbis having been in all the time), so I got two large *Lymnea stagnalis* and put them in. Yesterday I thought the hydra had left the glass and gone to the weeds, but on closer examination this morning, I find that out of about 100 hydras there are now only two or three left (*viridis*).—*J. Shawcross.*

Goat Moth.—I have now at the present time (April), three of the rank-smelling, peculiar-looking caterpillars of this moth, which were dug up in a neighbouring garden, and yesterday I saw another specimen, which had been turned over by the harrow used in getting in order a particularly weedy piece of the above. In our garden, which is better cultivated, I never meet with these singular larvæ. Specimens of these caterpillars are brought to me nearly every season from the garden mentioned. Now is it not rather singular to find these caterpillars in the earth at all? The works on entomology which I have in my possession never hint at such a thing.—*W. H. Warner, Standlake.*

Origin of Jet.—Will any of the readers of Science-Gossip inform me whether it has been really decided what is the nature and origin of jet? I myself am of opinion that jet is not fossil wood, as, I believe, is generally supposed; but that it has been some kind of bitumen or petroleum, similar to that we find nowadays in the chambers of many fossils. I will say no more at present; practically, I am altogether unacquainted with jet, having never sought for it in its native state; but if a discussion on the subject is opened, I will forward you my opinions in full.—*T. P. Dotchon.*

The Birds of Jersey.—Owing to the short space of time at my disposal, I was unable to reply to Mr. Cecil Smith's observations on my notes on the Jersey birds, which appeared in the May number of Science-Gossip, before this. I have in the meantime, however, revisited the island, where I am writing this, and have carefully investigated the evidence of my former notes, which I now give in response to the remarks of Mr. Smith. As already stated, it is chiefly to the kindness of Mr. J. Sinel, of Bagot, Jersey, that I am indebted for the results of careful observations made by him, exclusively in Jersey, for a period extending over twenty years, and all my notes on the birds of the island either emanated from him or received his endorsement. First, as regards the occurrence of the golden eagle, about which Mr. Smith expresses himself not a little sceptical. The following is an extract from a letter written for my perusal by Mr. H. J. Charbonnier, naturalist, of Bristol, dated May 2nd, 1882. "Yours of the 30th April to hand. It was my father, Mr. T. Charbonnier, who was in business in Jersey and who had the bird you mention in his possession. I remember it quite distinctly, and until six months ago, I had a daguerreotype portrait of the bird (since unfortunately broken). I am perfectly certain it was a genuine golden eagle (*Aquila chrysaëtos*), and as I have had a good many through my hands, amongst others, a British specimen shot in the Orkneys, there is no room whatever for doubt in the matter." Mr. Sinel saw this bird soon after it had been killed, and he based his observations upon notes taken then.

The specimen shot about 1849, was killed by Mr. Matthew le Gallais, in Vallée des Vaux; the remains of this bird Mr. Sinel also saw, it had the tarsi feathered, and it measured eight feet in spread of wing, both of which characteristics are a guarantee of its identity. This, I venture to think, will dispose of the question as to the occurrence of the golden eagle in Jersey.

Mr. Smith, however, here adds that "Professor Ansted's list usually sins much more in admitting species without sufficient evidence, than in including (? excluding) those birds which had any claim, however slight, to be included in the Channel Islands' list." This, however, does not seem quite in accordance with what is known about the birds of Jersey, at any rate, as I find authentic records of the following fifteen species which are not in Professor Ansted's list, viz. golden eagle; great bustard; manx shearwater; Richardson's skua; muscovy duck; black-headed gull; glaucous gull; pectoral sandpiper; purple sandpiper; red-legged partridge; great grey shrike; lesser redpole; spotted fly-catcher; willow wren and fire-crested wren. The bee eater has also been killed. And of the birds recorded by Professor Ansted, only eight species, viz. white fronted goose; eider duck; king duck; purple heron; swallow-tailed kite; snowy owl; raven, and the common partridge, have not been seen or recorded by those who have of late years studied the local birds.

We now come to the kite, of which Mr. Smith also confesses himself doubtful as having been "frequently seen." I was fortunate last year in getting a good view of one of these birds when I was in the company of Mr. J. Romeril, of Longueville, to whose gun over one hundred and twenty species of Jersey birds have fallen; he knows the local birds from a practical acquaintance with them of some fifteen years, and he assures me that the kite is "very frequently seen" in Jersey; this coming from such a keen observer, is conclusive. Mr. Caplin, of St. Helier's, also informs me that he stuffs (on the average) one of these birds every year. The common buzzard is sufficiently well known to prevent the possibility of its being mistaken my me or my friends here for the kite.

Mr. Cecil Smith next denies that the starling is a winter visitant only, and adduces as evidence, that "a few certainly remain to breed in Guernsey, and *I should think* also in Jersey" (the italics are mine). Now my notes do not refer to Guernsey, where Mr. Smith is perfectly right in stating that the starling breeds, but to Jersey, and that which will apply to the one island, does not necessarily apply to the other. I therefore repeat my observation that the starling is a winter visitant only in Jersey, with this modification; that from all the evidence that I have been able to obtain, some fifteen years ago a starling's nest was stated to have been found at Longueville, by one Mr. Payne, but the record is considered doubtful and cannot be substantiated.

It is dangerous to form conclusions on the fauna of Jersey from data collected in Guernsey, and it is moreover calculated, as in this case, to mislead the student who visits the islands for the purpose of personal observation. The same observations will also dismiss Mr. Smith's remarks on the grebes mentioned by me, and about which I certainly was not mistaken, as he suggests.

As regards the merganser, the bird referred to was, of course, the red-breasted merganser, and not *Mergus merganser*, for I was writing of them by their popular names.

The discrepancy alluded to by Mr. Smith, under the subject of gulls, is an obvious typographical error; it is printed "the gull," it should have been "the common gull." In regard to Mr. Smith's remarks about the two female specimens of the great bustard, shot at Samares, and referred to by me in my paper, a curious error seems to have found its way into the report from which he quotes, giving the contents of their crops as containing, amongst other things, ivy leaves, &c. Now my friend Mr. Sinel, opened and reported upon one of these crops himself (the other was not examined), and he assures me that not only was there no ivy at all, but nothing to give rise to the supposition that there was.

I can only find the following evidence of the occurrence of some of the great bustards mentioned by Mr. Smith as having been seen in the neighbourhood of the Channel Islands about the year 1870. The late Captain Hammond, who was in the habit of going out almost daily on Gorey common and marsh, on the look-out for birds, assured Mr. Sinel, about that time, that he saw a pair of these rare birds, which no doubt then were looked upon as something very unique. In conclusion, I beg to thank Mr. Smith for the interesting notes embodied, with his criticisms on my paper, and which are a valuable addition to the information on this subject.

Whenever he is desirous of obtaining any particulars as to the occurrence, appearance or habits of any birds of the island of Jersey, Mr. Sinel, of Bagot, to whose courtesy I am so much indebted, will be most happy to furnish him with all the information that he can on this head.—*Edward Lovett.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

A. B.—The work in the press already announced on "Our Common British Fossils, and Where to Find Them," is intended to fill the want you express, and to enable a student to recognise and class the various invertebrate fossils.

H. R. Alexander.—The solution of carbolic acid and benzine would do well enough, and clear your herbarium of mites. Afterwards place pieces of camphor in the herbarium. Camphor dissolved in spirits of wine is also a good insecticide. Sowerby's "British Conchology" is a capital book. For flowering plants get Messer's "New and Easy Method of Studying British Wild Flowers by Natural Analysis," price 10*s.* 6*d.* (London: D. Bogue). Hayward's "Botanist's Pocket-Book" (London: Bell & Daldy), price 4*s.* 6*d.*, is a capital guide. It is bound in limp cloth, so as to go easily into the pocket.

WILFRED.—The insect sent was the common cockchafer (*Melolontha vulgaris*).

G. F. W.—White flowers of *Scilla nutans* are not uncommon.

C. ASHFORD.—Rye's "British Beetles" is the best you can get. Among others are Cox's "Handbook of the Coleoptera of Great Britain;" Spry & Shuckard's "British Coleoptera Delineated;" Stephen's "Manual of British Coleoptera;" but the fullest account (with exquisite illustrations) is in Curtis's "British Entomology," a work in 8 vols., describing and illustrating all the genera of British insects. It was originally published at £44 10*s*., but may now be obtained of such booksellers as Wesley, Essex Street, Strand, at a much lower rate. The other vols. may also be obtained there.

F. G. F. GRANT.—The bark of the silver fir is not affected by a fungus, but by the abundant presence of Aphides, allied to, if not identical with, those found on the bark of apple-trees, called *Eriosoma lanigera*. It forms woolly patches which protect the eggs and young, perhaps doubly, by screening them from wet and cold, and by simulating the appearance of a white fungus.

W. DALTON SMITH.—Many thanks for your slides of calcium acetate. They make capital polariscope objects. Your other slides are (No. 1) Galls, called "oak spangles," made by a species of Cynips (see "Half Hours in the Green Lanes," p. 197, fig. 139); No. 2. found growing in Deane's gelatine medium, is evidently the mycelia of some fungus, but it is difficult to say what.

J. S. WILLIAMS.—The leaf you sent us is part of the frond of a fern, probably Alcicornis, and the brown objects you thought were "rust" or funguses, are the sporangia, or spore-cases.

A. S. is going to Lanarkshire, and wishes to obtain all possible information respecting the geology and entomology. Perhaps some of our readers will help him. He will find Professor Geikie's Geological Map of Scotland both necessary and useful.

W. FOTHERGILL.—Accept our best thanks for specimen of malformed foxglove, which was a very interesting specimen.

C. E. WADDING.—The mould on fig. was too obscure to be specifically made out.

EXCHANGES.

WANTED, young hedgehogs with soft nascent spines, nest of harvest mouse, and live specimens of British or foreign reptiles and batrachians. Will give in exchange cash or other natural history objects.—J. M. Campbell, Kelvingrove Park, Glasgow.

FRESH collected examples of *ulmata*, *hastata*, *omicronaria*, *argiolus*, offered in exchange for lepidoptera or birds' eggs.—G. Garrett, 13 Burlington Road, Ipswich.

WILL give a few microscope slides for two full-grown frogs—*R. temporaria* or *esculenta*; latter preferred.—B., 36 Windsor Terrace, Glasgow.

Smilacina bifolia, *Trientalis Europæa*, *Hippophae rhamnoides*, and other rare plants, in exchange for others not in collection, either British, European, or North American.—J. A. Wheldon, 9 South Street, Scarborough.

WANTED, living or freshly-killed examples of British bats, shrews, or field mice, especially the rarer ones. Will purchase or exchange.—J. A. Wheldon, 9 South Street, Scarborough.

WANTED, Gosse's "Naturalist's Sojourn in Jamaica," "Letters from Alabama," Bell's "Crustacea," and several of the Lovell Reeve Popular Series of Natural History, in exchange for other books or cash.—C. A. Grimes, Dover.

LARVÆ of *B. hirtaria* in exchange for northern or local lepidoptera.—G. Pearson, 10 Shakspeare Road, South Hornsey, N.

Littorina æstuarii, Jeff. from the river Deben, in exchange for other local species or varieties.—Wm. Jordan, Cockfield, Sudbury, Suffolk.

"LIFE of Edward Forbes," in good condition, published at 14*s*. (Griffith), "Text-book of the Microscope," equal to new, coloured plates, and other natural history books. What offers? Wanted, British plants, mosses, or grasses.—J. R. Murdoch, 24 Blenheim Place, Leeds.

WANTED, dried plants of *Nigelia Damascena*, *Lawsonia inermis*, saffron, darnelgrass, wormwood, woods of aloes, olive, cedar of Lebanon, cypress, &c.—What exchanges?—Tunley, Southsea.

SCIENCE-GOSSIP, in numbers, complete from the commencement to the present date, will be given for a copy of Wilson's "Bryologia Britannica."—J. C., The Athenæum, Manchester.

"MIDLAND NATURALIST," vols. i. and ii., bound in cloth. Offers. Micro preparations, &c.—J. H. Ward, Oakley House, Caversham Hill, near Reading.

WANTED, to exchange a full report of the meeting of the British Association in Dublin (1878) and "Cassell's Popular Educator" (new edition), parts 1 to 19, in perfect order, for any suitable offer of books. History or law preferred. The former would be given for a copy of Lord Macaulay's "Essays on Warren Hastings and Lord Clive."—John Benner, 9 Bridge Street, Tralee, Ireland.

A VARIETY of good slides for exchange. Want unmounted parasites, sections of horns and hoofs, palates of doris, trochus, &c.—J. C. Blackshaw, Cross Street South, Wolverhampton.

WANTED, nest and eggs of the following birds in exchange for other eggs:—redback, shrike, nightingale, crossbill, lesser whitethroat, goldfinch, hawfinch, fire-crested wren, brambling finch, Lapland bunting, and nightjar, and kingfisher's egg in clutches. Please send list of duplicates and receive mine.—H. Walton, Birtley House Lodge, Birtley, Chester-le-Street.

SUFFOLK crag shells, about eighty species. Wanted, British birds' eggs.—Hugh Turner, Ipswich.

Phyllobius uniformis, *Otorhynchus picipes*, and other weevils in exchange for any object of interest.—J. Stroud Williams, The Manse, Mold.

WANTED, SCIENCE-GOSSIP for 1881 in exchange for the first twenty-five numbers of "Knowledge."—E. A. Snell, 70 City Road, London.

A FEW local side-blown eggs to exchange for others.—S. E. W. Duvall, Butter Market, Ipswich.

WANTED, British dragon-flies; can give in exchange a few lepidoptera or land and freshwater shells.—Geo. F. Wheeldon, 6 Newhall Street, Birmingham.

WANTED, Stark's "History of British Mosses" in exchange for any book value 5*s*. — H. Alexander, jun., Swanshurst, Beulah Hill, Upper Norwood.

WANTED, to exchange lepidoptera from Middlesex for common birds' eggs or skins, English or foreign.—W. J. V. Vandenbergh, F.M.S., Hornsey, N.

WANTED, *Hyoscyamus niger*, in flower; good exchange.—Mr. Higginson, Newferry, Birkenhead.

DUPLICATES: a large quantity of genuine foreign stamps to exchange for lepidoptera or birds' eggs.—John E. Robson, 15 Northgate, Hartlepool.

SIDE-BLOWN eggs of dipper, rook, common sandpiper, common tern, redshank, magpie, black-headed gull, moorhen, jackdaw, &c., for other specimens. Unaccepted offers not answered.—W. Edgar, Warwick Road, Carlisle.

OFFERED, L. C., No. 55, 221 (*Arenaria uliginosa*, Hooker), 859, 1040, 1319, for other rare and well-dried plants. Send list to Eric, 7 Shaftesbury Street, Stockton-on-Tees.

BOOKS, ETC., RECEIVED.

"Ants, Bees, and Wasps." By Sir John Lubbock, Bart., M.P., F.R.S. London: C. Kegan Paul & Co.

"Notes on Cage-Birds." By W. T. Greene, M.D., &c. London: L. Upcott Gill.

"Synopsis of the Freshwater Rhizopods." By Romyn Hitchcock. New York: R. Hitchcock.

"Annual Report of the Belfast Naturalists' Field Club."

"Natural History Notes." Vol. ii., No. 6.

"Midland Naturalist."

"Northern Microscopist."

"Land and Water."

"Studies in Microscopical Science." Parts 1, 2, 3, 4.

"Aunt Judy's Magazine."

"Ben Brierley's Journal."

"Popular Errors, &c., Connected with Natural History." By J. A. Wheldon.

"American Naturalist."

"Canadian Entomologist."

"Insects Injurious to Forest and Shade Trees." By A. S. Packard. Washington: Government Printing Office.

"Boston Journal of Chemistry."

"Bulletin of the Torrey Botanical Club, New York."

"Anales de la Sociedad Rural Argentina." Peru.

"Revista." Oporto.

"Journal of the Microscopical Society of Victoria." Nos. 1 and 4.

"La Science pour Tous."

"Cosmos: les Mondes."

"Le Monde de la Science."

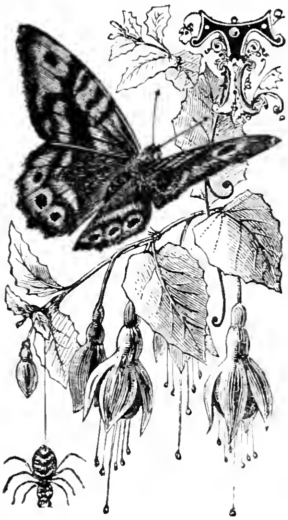
&c. &c. &c.

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

BOTANICAL NOTES FROM THE SWISS HIGHLANDS.

By Dr. De CRESPIGNY.

"The Stockhorn."



THE Stockhorn, 7,000 feet. The Riffel in the Valais country excepted, there is perhaps no other mountain in all the Swiss Alps which affords greater gain to botanists than the Stockhorn. It is barely 7,000 feet above the level of the sea; and as several of the adjoining peaks of the chain to which it belongs attain nearly the same elevation, there is nothing very striking about it in respect of altitude. Above, bare and rugged crags; below, dark pine forest; such is the aspect of the range from near Thun: but from the Simmenthal, steep grassy inclines are seen extending upwards above the pines to the actual summits of the ridge, or nearly so. From the eastward the peak of the Stockhorn does not present the peculiar truncated form before mentioned; it appears, viewed from this direction, pointed and more truly hornlike. The formation is calcareous; Jura limestone.

The ascent from Thun is either by Blumenstein, from which village there is a good bridle-path to the Wallalp; thence an hour and a half of steep and arduous climbing round the horn to the right and along its ridge to the summit; or by Amsoldingen and Niederstocken, whence by a good footpath up the Aelpithal to the Wallalp, and so onwards as before. Easier, however, is the ascent from Erlenbach in the Simmenthal by a path which leads up over alpine pastures (of which the lower are separated from the higher ones by a belt of forest) to a very steep ridge between two perpendicular rocks hundreds of feet high; over this—rhododendrons here abundantly—into a hollow, with a tarn in it called the Stockensee: and then another hard pull over steep pastures to a long narrow ridge called "The Dog's Back," to the last grassy incline and on to the summit. The alpine rarities at this elevation, edelweiss, &c., have to be sought for in the little patches of soil among the rocks and in the crevices. There is no danger, with proper precaution. Avoid the edge of the vertical precipice on the northern face, and remember that the steep grassy slopes are slippery alike in dry and in wet weather. Strongly nailed shoes and a trusty alpenstock are therefore indispensable. Fatal accidents, through carelessness, are far from infrequent. There is no inn on the summit as there is on the Niesen, and the view of the high Alps is not so fine, being intercepted in part by this mountain.

Another approach is from Reutigen near Spiez, by a steep zigzag path up a long narrow slip of grassy slope to the lower pastures in this direction; or by a rough path up through the forest on the left; thence round the base of the overhanging heights to the ridge before mentioned, and so onwards as from Erlenbach. A good locality here is a stony gorge to the right, behind the last chalet. On the pastures *Gentiana lutea* grows in great abundance, and imparts a character to the scene, alone in its glory; for the cattle will not touch it, nor the aconite, of which here and there, in little damp hollows, small patches are frequently met with *en route*.

I. Lower section up to 5000 feet: *Arabis alpina*; *Achillea macrophylla*; ascent from Stocken. *Arenaria ciliata*; débris; *Astrantia major*; fine and very plentiful on the steep grassy incline ascending from Reutigen. *Apoceris fœtida* (near, if not = *Arnoseris*), wood left of this incline, high up; in no way like our species of *Arnoseris*; leaves runcinate, all radical, scapes single-flowered, heads large; achenes few, large. *Aconitum rostratum*; *bicolor*; varieties, not noticed by Bouvier, of a very variable plant; the subpentagynous forms are described as *paniculatum*, *rostratum* and *hebegynum*, of which the aggregate name is *Commarum* (see Hegeteschweiler, &c.), all distinct from the yellow-flowered species; *Cerinthe glabra*; *Corydalis fabacea*, woods; *Cotoneaster vulgaris*; *Campanula barbata*, frequent on subalpine pastures, and a handsome plant, though stunted and few-flowered at higher elevations. *Gentiana cruciata*; *ciliata*; *Germanica*: dry woods and pastures; *utriculosa*, wet pastures, rare; calyx winged, the tube inflated; *ciliata* has a 4-fid calyx and 4 to 5-fid corolla, of which the lobes are fringed below; *cruciata* has a whorled inflorescence, and is allied to *lutea*; *Hieracium Jacquinii*; *villosum*; *Laserpitium latifolium*; *Siler*; *Malva Alcea*; *Plantago alpina*; *montana* (=*atrata*); *Pedicularis verticillata*; *Rhamnus pumila*, ascent from Erlenbach, rocks before coming to the tarn. *Seseli Libanotis*; *Stellaria nemorum*; *Swertia perennis*; marshy places. *Streptopus amplexifolius*; woods; rare; a liliaceous plant, with habit of Polygonatum, leaves closely set, amplexicaul, flowers greenish-white, solitary, on filiform interpetiolar peduncles; *Scabiosa lucida*.

II. Upper section, above 5000 feet: *Adenostyles albifrons*; *Anemone alpina*; *narcissiflora*; *Anthericum serotinum*: above, on the steep incline towards the Wallalp. *Astrantia minor*; *Aquilegia alpina*; rare; *Arctostaphylos alpina*; ascent from Niederstocken and near the Wallalp. *Androsace chamæjasme*; *Helvetica*; *pubescens* (= *alpina*); all three species in rock crevices near the summit. *Aster alpinus*; *Allium Victorialis*; *Athamanta Cretensis*; *Avena distichophylla*; *Arenaria polygonoides*; *Biscutella lævigata*; *Bupleurum ranunculoides*; *stellatum*. This species is a somewhat larger plant, with less leafy stems than *ranunculoides*; involucral bracts large, mucronulate; those of the involucels connate below. *Cherleria sedoides*; *Carex atrata*; *firma*; *tenuis*=*brachystachys*; Schrank; ascent from Erlenbach, before coming to the tarn. *Campanula thyrsoidea*; inflorescence in a leafy thyrsoid spike, flowers imbricated, of a yellowish colour; near *spicata*: rocky places high up. *Draba tomentosa*; *nivalis*, a var. of *Johannis* (= *Carynthiaca*); *stellata*, another var. of *Johannis* (= var. *β. minor*; other synonyms of *nivalis* are *fladnizensis* and *alpina*, var. *minor*); *aizoides*; *incana* (= *contorta*; *confusa*); *Pyrenaica* (=*Petrocallis Pyrenaica*); near the summit. *Erigeron alpinus*; *uniflorus*; *Festuca pumila*; *nigrescens*; *violacea*; *Globularia nudicaulis*; *cordifolia*; *Gentiana acaulis*; *Bavarica*; *nivalis*; *verna*; *Geum montanum*; *Gymnadenia odoratissima*; between the Aelpithal and Wallalp, ascent from Thun; differs from *conopsea* in its narrower leaves and much smaller, stronger-scented flowers. *Gnaphalium dioicum*; *Carpathicum* (= *alpinum*); *Leontopodium*; summit; *Gaya simplex*; *Hedysarum obscurum*; *Hutchinsia alpina*; *Hieracium aurantiacum*; *alpinum*; *Helianthemum œlandicum*; *Juncus filiformis*; *triglumis*; *Linum montanum*; *Lonicera alpigena*; *Leucanthemum alpinum*; *Luzula spicata*; *Meum Mutellina*; *Myosotis alpestris*; *Nigritella angustifolia*; *Orchis globosa*; *pallens*; *Onobrychis montana*; *Orobus luteus*; *Oxytropis montana*; *Halleri*; *campestris*; and var.; rocky débris in company with *montana*, which much resembles in habit; the flowers are yellowish, with a violet spot on the keel near the point (a var. of *montana*?). *Phaca australis*; *astragalina*; *frigida*; *Primula viscosa*; *Pinguicula alpina*; *Pedicularis foliosa*; *versicolor*; *Rhamnus pumila*; rocks, ascent from Erlenbach before coming to the tarn, *Rosa alpina*, var. *Pyrenaica*; Rhododendrons both species; *Salix reticulata*; *myrsinites*; *retusa*; habit of reticulata, but leaves sessile retuse as indicated, and their nerves parallel; *hastata*, leaves certainly not hastate in the ordinary acceptance of the term, but oval or oblong. *Senecio cordatus* (= *alpinus*, *Cineraria cordifolia*) about the chalets frequently; *nebrodensis* (= *lyratifolius*), Wallalp; *aurantiacus*, near the summit. *Silene acaulis*; *quadrifida*; this is a delicate little plant with slender subdichotomous stems, usually one-flowered, petals quadridentate, white; wet places among the rocks. *Sempervivum tectorum*; *Saxifraga oppositifolia*; *cæsia*; *planifolia*; *Sedum atratum*; *Soldanella alpina*; *Spergula saginoides*; *Trifolium alpinum*; *Tozzia alpina*, wet places by the Mieschfluh and Stockentain. *Viola calcarata*; *lutea grandiflora* (= ? *Sudetica*); intermediate between *calcarata* and the variable *tricolor*, from which it differs in being perennial, and in the form of its stipules and showy yellow flowers streaked with purplish-black lines; its caulescent habit and much shorter spur distinguish it from yellow-flowered varieties of *calcarata*; plentiful on the grassy inclines high up; *Veronica bellidioides*.

On the Neunenen grow also *Agrostis rupestris*; *Androsace lactea*; *Arenaria ciliata*, var. *grandiflora*; *Campanula linifolia*; *Carex capillaris*; *sempervirens*; *Gnaphalium supinum*, var. *pusillum*; *Polygala alpestris*; leaves rosulate, resembles *calcarea* somewhat, but flowers half the size; *Poa distichophylla*; *Rumex scutatus*.

The Niesen, 7750 feet, may be ascended from Thun by way of Wimmis; from Interlachen, from either Heustrichsbad, or Frutigen, all three bridle-paths, and all falling into each other half-way up. At Stalden, the last portion of the way is zigzag up very steep grassy slopes. Near the last chalet is a high peak called the Bettfluh, 8000 feet; to the right of this is the actual summit, a pile of shattered rock like the ruins of some vast pyramid; magnificent view of the Bernese Alps. Directly opposite is the Blümlis Alp with the rest of the chain right and left of it from the Wetterhorn to the Altels. The base and flanks of this Niesen are of limestone, but the upper portion is composed of gneiss and granite. Displacements and distortions, added to the great changes effected by metamorphism, make of Swiss Alpine geology a very difficult and complicated study, so that in some localities it is hard to determine what is igneous and what is truly sedimentary formation. In many places along the northern face of the Alps one may observe (the effect of contortions) limestone underlying primitive rock; as in the Mettenberg base of the Schreckhorn for instance, where the limestone is seen lying between gneiss and mica schist. Titlis again may be studied with advantage. (For exhaustive details of the literature of this subject, see Dollfus Amuset, *Matériaux pour l'étude des Glaciers.*)

The descent to Wimmis from Staldenegg is down a ravine between the Bettfluh and the Niesen proper, over the Stalden torrent and along the south slope of the Bergfluh, on the flank of the Niesen, into a gorge which runs parallel to the Simmenthal. Refreshments are to be had at the lower Stalden chalets, and on the summit there is also an inn with sleeping accommodation. Best localities for botanising are the rocky débris at the foot of the Bettfluh and the rocky patches of pasture higher up. It was on this mountain that Aretius first discovered the small Primulacea called after him, allied to Androsace, and included by De Candolle in that genus. In addition to most of the plants growing on the Stockhorn, the following occur here :—

Achillea tanacetifolia ; Artemisia mutellina ; very rarely ; *Arnica montana ; Agrostis rupestris ; Avena versicolor ; Aconitum rostratum ;* ascent from Wimmis (see remark above on Aconite variety). *Circæa alpina ;* woods ; *Cirsium spinosissimum* (=*Carduus*) ; *Carex frigida ; capillaris ; Dentaria digitata ; Eryngium alpinum ;* stems of this species are unbranched, and the radical leaves on long petioles are oval and cordate, those of the stem palmatifid, margins of both more or less spiny ; rocks. *Gagea fistulosa ; Geranium lividum ;* near Wimmis. *Kobresia caricina ;* summit. *Silene rupestris ; Sempervivum montanum ;* leaves reddish, covered with short glandular hairs ; rare ; *Senecio Fuchsii*, also on the Stockhorn range, in the woods below near Reutigen, differs mainly from *Jacquinianus* in having narrower leaves, of which the petioles are not winged, and in the smaller capitula.* *Thlaspi rotundifolia ;* near the summit ; rare ; *Viola calcarata*, var. *caulescens*, &c. Near the bridge, over the Simmen, on the road from Wimmis to Thun, there is a slope composed entirely of rocky débris fallen from the mountain above. Many alpine plants grow here side by side with those of the plain : *Athamanta Cretensis ; Aster alpinus ; Bupleurum ranunculoides*, fine ; *Cochlearia saxatilis ; Draba aizoides ; Hieracium glaucum ; Linaria alpina ; Melica ciliata ; Physalis Alkekengi ;* and several others.†

Between the Stockhorn range and Thun there is a belt of forest called the Kandergrien, and before the torrent of the united Kander and Simmen was diverted into the lake its course was in this direction. A double line of immense rocks and boulders shows the moraine nature of the ancient river banks ; and between this Kandergrien and the foot of the range extend also in a double line some low hills of similar formation, which indicate the ancient bed of a glacier in prehistoric times, when all these valleys of the Aar, the Kander, and the Simmen were depositories of ice and snow, which extended down from the high Alps beyond as far as Berne, where they were in contact with these Rhone glaciers. Several alpine plants, sprung from seed brought down by the torrents, are naturalised in the Kandergrien, and, besides these, many other interesting plants abound there, more or less so. *Anemone ranunculoides, Actæa spicata, Alchemilla alpina, Arctostaphylos Uva-ursi*, plentiful, *Circæa intermedia*, plentiful between Buchholz hamlet and a cavern in the forest called Rindfleisch ; *alpina*, very rarely. *Carduus defloratus ;* occasionally ; *Cephalanthera ensifolia ; Calamagrostis varia ; Corallorhiza Halleri ;* both sides of the road near the Rindfleisch cavern. *Cypripedium Calceolus ;* almost exterminated. *Dryas octopetala ; Erica carnea ;* plentiful ; *Gypsophila repens ; Gentiana cruciata ; ciliata ; Habenaria viridis ; Inula Vaillantii ; salicaria ;* former near Strätlingen tower. *Lonicera alpigena ;* between the road to Amsoldingen and the footpath to Thierackern, near the road to Amsoldingen. *Oxytropis campestris ; Laserpitium glabrum ;* towards the bridge near the cavern. *Melampyrum sylvaticum ; Polygala Chamæbuxus ;* plentiful ; *Physalis Alkekengi ;* plentiful between the cavern and Buchholz. *Pinguicula alpina ;* in the cavern. *Phyteuma orbiculare ; Pyrola rotundifolia ;* abundant ; *chlorantha ;* between the roads to Thierackern, leaves smaller, toothed, style long, sepals broad, oval. *Thalictrum aquilegifolium ; Rosa alpina ; Spiræa aruncus ; Thesium alpinum ; Valeriana tripteris ; montana ;* and many others.

This is an easy excursion from Thun ; a great drawback, if the weather be fine and warm, are the gadflies. At the foot of the first range of low hills is the village of Amsoldingen, where there is a small lake. On the southern shore of this grows *Carex microstachya ;* also *Carex limosa* and *alba ; Cyperus fuscus*, &c. By another lake not far off is *Cladium Germanicum*, and on intervening boggy ground, *Andromeda polifolia*. A pleasant excursion is to the summit of the Grüsisberg, formation conglomerate, close to the town ; elevation about 4000 feet above the sea, returning by the Hünibach gorge. There is not much, of course, out of the common ; *Goodyera repens*, and *Vaccinium Vitis-Idæa* are extremely frequent ; *Carex humilis ; ornithopodioides ; Cyclamen Europæum ; Dianthus superbus ; Hordeum sylvaticum ;* near the Rabenfluh ; *Hippophae rhamnoides ;* by the roadside ; (plentiful at the mouth of the Kander). In the gorge, *Valeriana tripteris ; Saxifraga mutata*, &c.; *Epilobium rosmarinifolium ; Cotoneaster tomentosa ;* and several willows. Above Oberhofen, a little

* Both species = *nemorentis*, &c.

† On the Männlifluh, 8500 feet, Albrist, 8900 feet, and other mountains of the Niesen chain, or rather of the chain to which the Niesen belongs, grow *Azalea procumbens ; Arabis cærulea ; Androsace Helvetica ; Avena subspicata ; Cardamine alpina ; resedifolia ; Carex fœtida ; nigra ; Cerastium latifolium ; Campanula Cenisii ; Draba Johannis ; frigida ; Festuca pilosa ; Geum reptans ; Galium Helveticum ; Gentiana tenella ; brachyphylla ; Hieracium*, several uncommon species; *Pedicularis comosa ; Ranunculus glacialis ; Stellaria cerastioides ; Saxifraga biflora ; cuneifolia ; Trifolium rubens ; Viola Cenisii*, &c. (See the Swiss Alpine Club Reports.)

beyond the gorge, on dry banks above the village, *Andropogon Ischæmum.* At Schwarzenegg, on the road to Berne, is a boggy marsh producing several good sedges: *Heleonastes, limosa, filiformis;* with *Scheuchzeria palustris; Vaccinium uliginosum; Andromeda polifolia; Eriophoron alpinum; gracile,* &c.

MY FIRST VISIT TO THE HEART OF THE GRAMPIANS.

Part II.

A FEW warm and deceitfully genial days towards the end of September, induced me to bid farewell to the bright vale of Clyde, and to plunge into the stern and gloomy desolation of that most ancient country of the Grampians; there to dwell for a time with the foxes, ptarmigan and white hares, among the grey micaceous stones, grey water, and greyer skies of the Rannoch district. High perched as is this Celtic tarn, some 668 feet above the sea level, its unruly waves are ever surging to the wind; so that hard winters, like that of 1880, transpire without wholly disfiguring with ice the fair mirror of summer, leaving at the worst of seasons a recollection of delight for the casual wayfarer. Yet although the birches hung bright in gold and purple sheen, welcoming me to the land of mountains, and glens, and of heroes; late autumn glistered with but transient smile on favoured Rannoch, and wind and tempest soon closed in a proverbially wet and disastrous year in the Highlands.

Indeed the only ascent of any interest I undertook was a climb with an acquaintance of mine up the burnie that pours over the rugged flank of Schiehallion, a mountain that raises its bald and fairly conical head to an elevation of some 3547 feet above the sea level. We set off to the task nerved with strong determination. At the foot of the water-course (*b*, in view) we entered a small gully, where the junction of some slate layers, perhaps of great age, with a superimposed sandstone was seen; and then, as we ascended, rounded blocks of purple stone, apparently clay-slate, very soluble in water, and what appeared interesting containing fragments of a coarse granite embedded in their mass were from time to time observed. Grown weary with the rocks we next commenced to clamber after the mountain plants that hung from the damp crevices of the waterfalls. Here we picked a late blooming yellow saxifrage, and there tore down the elegant sprays of an old world lycopod, one of the last of its clan. How has this mighty forest of the coal period perished on these mountains, that now cherish the last traces of their former beauty in their dwarf ferns, horse-tails, and club-mosses! Yet what a terrible time of ague a life in a dripping coal forest would have been to us mortals! The more modish waxen leaves and glossy berries of the alpine creepers next incited the curiosity of my companion, so we turned a-berry hunting. On the rocky ledges the blaeberries shot up higher in the shade; and among the decaying crimson of the heather, the inky crowberry (*Empetrum nigrum*) bristled thick. Here and there a tuft of the smooth scarlet bearberry (*Arctostaphylos*

Fig. 118.—Scarlet Bearberry *(Arctostaphylos Uva-ursi.)*

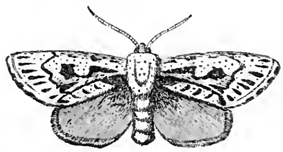


Fig. 119.—Moth (*Pachnobia hyperborea*).

Uva-ursi) trailed its waxen sprays, and I think I noticed too the leaf of the bramble-like cloudberry, called by northern poets the Grampian Edelweiss. The bog-bilberry, cowberry, cranberry and black bearberry were however wanting, and to obtain the latter, I expect we should have had to proceed as far as the scalped back of the Athole Sow. At least so saith the author of the "Berries of Rannoch."

Fig. 120.—Crowberry (*Empetrum nigrum*).

Of these berries the crowberry must be especially interesting to evolutionists. We in this case notice all the margins of, let us suppose the original leaves, systematically doubled over and joined beneath with a white line of cellular tissue, as if they had been thus sealing-waxed. What agency can have been at work on such nicknacks the wisest is left to guess. Berries naturally seek a foil in ferns, but all those graceful things I used to find in the crannies of the waterfalls when ascending Glen Turret, seemed sadly wanting on bare Schiehallion. A gentleman I met indeed assured me certain prizes could be gathered up a burn at the south side of the loch: he showed me in proof, I remember the filmy fern, green spleen-wort, oak fern, and a few others. Still, I suspect, after all, many of these fairy things we are accustomed to call alpine, would appear only to be highland in a secondary sense; often loving better a shelter in the wooded eminences to the south of the main chain of the Grampians, than the stern reality of the wild heights.

much struck with the profile of a large dyke rolling down its eastern declivity (*a* in view); that plainly suggested the idea of lava flowing from a crater, such as I pictured to myself might have existed to the east of the present summit; but the wind meanwhile had grown chill, so filling my pocket with pieces of coloured volcanic stone from a heap of macadam at the roadside, I was compelled to give up philosophising, and to move on.

My next visit was to have been to the Scotch Firs of Dall, the reputed vestiges of that old British forest, where three hundred years ago and more, wild boars were known to rustle, beavers to build, and wolves to make night hideous with their howls. (Proc. Nat. Hist. Glasgow. Soc. 1876, p. 138-9; Ray's Discourses, p. 174.) Black's Guide Book further informs the ignoramus that these gnarly groves have conferred fame on some species of insect. I know it not, but why should we moth-catchers not have our Alclethas, Allonas and Degrenas, and we grasshopper-hunters and palæontologists, our Vinvelas and Loras? But, gentle reader, to return, why I did not visit the forest of Dall and catch this new beauty myself, the sequel will, I think, sufficiently reveal. Only the morning after my ascent of Schiehallion the scientific, when sitting at breakfast in the hotel, I heard a gentleman read out from the newspaper, that the winter isotherm

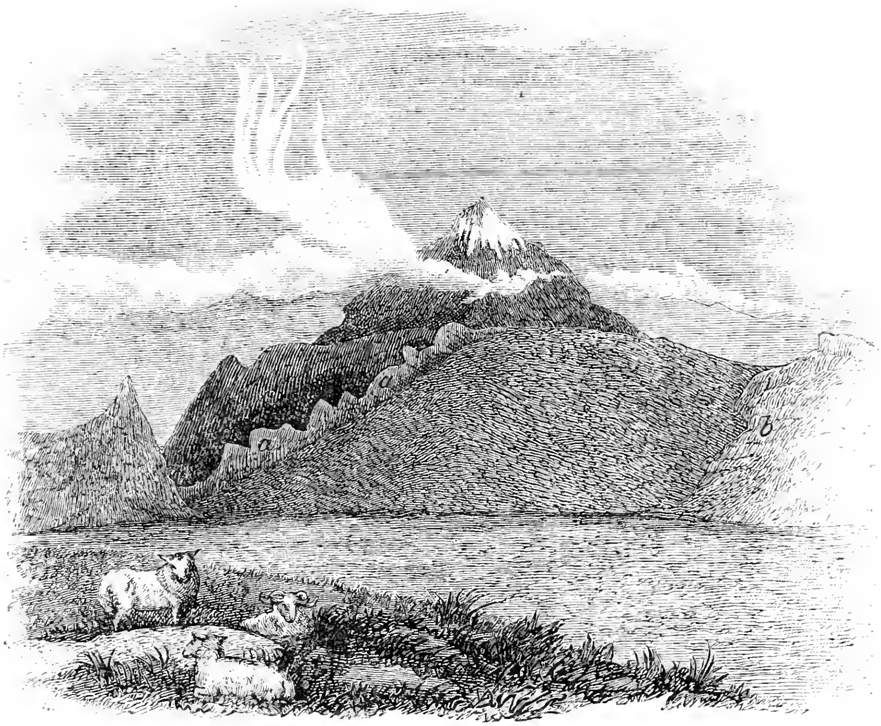


Fig. 121.—View of Schiehallion.

Redescending the gully to the foot of the mountain the search for plants was in turn discarded for a hunt after any insects that might be reposing in the shadow of the walls and tree trunks. Although the gems of the Rannoch fauna had now left the valley, we were here rewarded by finding certain well-known moths that come with the fall of the leaf; and, strange to say, the wings of the thick bodied individuals were nearly without exception crippled—I allude to examples of *Orthosia macilenta* and *Hadena protea*—and this circumstance I conclude to be the result of the unusually wet season. Stopping to take a last look of Schiehallion, lit by the gleam of the sun plunging behind Glen Coe to the islands of the blest, I was of snow and storm had moved southward to the Tyrolese Alps, and this sudden aërial rarefaction, I found to my chagrin to be the accepted signal for the children of the mist, who had long been gathering at the pibroch of the winds, to come careering wildly up the loch. The succeeding days therefore proved nothing but a series of dark sleet showers, alleviated with a fitful glow of mocking rainbows : until, awaking one morning, I was surprised by seeing all the stony summits of the Grampians sheeted in their winter snow, and ranged spectre-like against a pall of storm and gloom. As a parcel of old witches they had arisen overnight, and were frowning the southerner away to a climate somewhat less stern, fearful and desolate. Such warning was not to be wasted, and mounting the coach amid a parting salvo of hail and mist, I was soon speeding along the smooth green basin that marks the ancient extension of the loch eastward (indicated in the view). Here I encountered most congenial and seasonable food for rumination, in some of those wild moraine heaps so plentiful at this elevation. One of these in particular that had been cut through by the road, was especially interesting on account of its situation at the foot of a waterfall that was roaring down in brown flood ; and which, by its proximity, plainly demonstrated the burn had run on nearly in its existing stream since those ruthless old glacial days.

A fugitive glimpse of sunshine then cheered the road onward to the savage pass of Drumochter, where, entering the bleak Highland railway at its highest point, I was soon flying swiftly along beside the sparkling foam of the torrent Garry ; rattling to the tune of Bonnie Dundee, where slow and darkly it passed beneath the sylvan echo of the pass of Killiecrankie, draped thickly with the blood-red and yellow leaf ; and then emerging to bound over the forgotten blairs and scenes of contest between Gael and Saxon, while the telegraph wires projected on the window panes, rose and sank in giddy dance. As the valley widens, there comes a faint rustle on the ear from the woods of Birnam and Dunsinane, and we are arrived at Scone and Perth. East of Perth, as is known, lies the far-famed Carse of Gowrie : the first notch in the terraced slopes according to Robert Chambers ("Ancient Sea Margins," p. 30), by which we may hope eventually to reckon how deep the mighty Grampians once lay sunk in the icy flood. Half-an-hour, however, spent at the Perth refreshment room left little margin for physiography ; and as I looked at the waiter's coat-tails, I could only wish in my heart some field club of the future might discover sea-shells on the higher ledges in the Tay valley, and in this way furnish us good evidence for their being considered beach lines. And there is a reason for the wish. We believe that the Carse of Stirling, or more familiarly the valley of the Forth, was an arm of the sea even in historical times ; for beneath the peat moss on the plain the remains of two whales, associated with implements said to be harpoons of deer's horn, have been exhumed. In the same way the sister valley of the Clyde has yielded from beneath its green sod, several canoes or coracles ; and if we would penetrate still farther into the mist of time, we may discover running along its banks a series of raised beaches, the highest pitched up in places five hundred and twenty feet above sea level, which yet contain as a pledge of their genuineness the remains of certain sea shells, *Tellina proxima*. Thus I think it must become plainly evident, that the old red sandstone basin or country south of the Grampians and north of the Cheviots, was really depressed and elevated previous to the arrival of the Gaelic hunter, flushed in quest of his reindeer, mammoth, elks and oxen ; so that the question only remains, how far did the force of the earthquake and volcano sway at this period.

But the land of raised sea-lines was not doomed to be traversed wholly unmarked. The shallow Earn is bounded with a slope that leaves between it and the stream a green ribbon, marking a former broadening of the flow ; and as we rushed along on fire and wheels, this old earthwork threw out its angles salient and re-entering ; as it had been the relic of some garden terrace, digged on the edge of that bare and desolate wilderness we had left behind. Here, then, on the waveless shore of that Clyde and Forth basin, the loch Caledonia of yesterday, from whose western limits I set forth ; wrapped up against the mournful blast from my old summer acquaintance Benchonzie, on whose bleak brow *nives nunquam liquescunt*,* I close my note book and the natural history jottings of a pleasant northern tour.

A. H. SWINTON.

NOTES ON THE DIPPER (*CYNCLUS AQUATICUS*).

By W. DUCKWORTH.

THE dipper is such a great favourite with me, that I would willingly be at some trouble to make more widely known, how innocent it is of the crime laid to its charge of poaching on salmon ova. Mr. Kerr and others have noticed that it is fast disappearing from the banks of some of our streams ; happily my own experience does not agree with Mr. Kerr, as for some years past the dipper has certainly increased in numbers on many of our Cumberland streams. This fact I believe is owing to the gun licence, and to its not being persecuted here as a poacher, though many dippers are shot in winter, when they often leave the higher reaches of the rivers for the lower.

The following note from the pages of the "Newcastle Weekly Chronicle," which bears well on the subject,

* I found a patch of snow by the cairn, on its summit, at midsummer in the year 1874.

appeared some short time ago. It is a communication by Mr. Kerr. He says, speaking of a correspondent, Mr. T. Lister, "Formerly the dipper or water ouzel, used to be very plentiful on the various Derbyshire trout streams: but in my last three or four visits to Miller's Dale and the neighbourhood I did not see one. The keepers destroy them, saying they eat the spawn of the trout. I have tried to convince one or two of these gunners that they made a mistake in shooting this merry little bird, but in vain. Have you ever watched the action of the dipper? I have, with great interest, in years gone by. I used to go for a bit of salmon-fishing to the South of Ireland, and in the little river Cora, about twenty miles beyond Killinney, the dipper used to be quite common; but on my last two or three visits I did not see a single bird—killed, ruthlessly killed, on the (not proven) charge of eating salmon spawn. Mr. John Hancock and other competent naturalists have, by the dissection of birds killed on spawning beds, clearly proved that the birds so killed were not preying on the spawn, but on the water insects and larvæ which were preying on the ova of the fish. Yet the ruthless slaughter still goes on."

Mr. Robert Buchanan, in an article on the birds of the Hebrides, says: "I hear for the first time, on the authority of Dr. Gray, that the ouzel has been proscribed and decimated in many highland parishes, because, forsooth, he is supposed to interfere with the rights of human fishermen! In former times, whoever slew one of these lovely birds received as his reward the privilege of fishing in the close season; and a reward of sixpence a head is this day given for the 'water craw' in some parts of Sutherlandshire. To such a pass come mortal ignorance and greed!—ignorance, here quite unaware that the ouzel never touches the spawn of fish at all; and greed, unwilling to grant to a bird so gentle and so beautiful even a share of the prodigal gifts of nature."

The evidence of the authorities which I have quoted elsewhere, in favour of the bird, are the late Mr. F. Buckland, the late Mr J. K. Lord, the Zoological Society, &c., and my own experience.

And it is only lately, though I have been studying the dipper for some years, that I have evidence of its eating fish, and this I believe only very occasionally. The following from a correspondent in the lake district, a keen observer of birds, is very interesting on this point. "This summer (1881) I saw the dipper in pursuit of a minnow in a small pool of water about two feet deep and two or three yards in extent, which it caught after a good deal of turning and twisting about, using its wings like the flappers of a seal. After securing the fish, it flew a couple of yards to be safe from the water, and then gave the fish a peck upon the shoulder and after a second or two another on the tail, and then after a second or two more, it took it up and swallowed it head first. A few minutes after this I saw the dipper take another minnow from under a stone in shallow water, which it demolished in a minute or two, eating it the same way as it did the first. Before seeing this I had my doubts about this bird taking small fish or fry. Yet they cannot do much harm, I think." I know another good naturalist who has observed the same thing. My belief that it only occasionally resorts to a fish-diet, is from the fact that so seldom is fish, or the remains of fish, found in the stomach of the dead bird; this is borne out by many eminent naturalists, and having been at many inquests upon the dipper I could certainly with a clear conscience have given a verdict of not guilty of fish eating. As to the ova, I know of no single case where they ever formed part of the contents of a dipper's stomach. A nest of young dippers taken from this neighbourhood and forwarded to London, were kept for some time solely on the larva of the stone fly (*Perla bicaudata*). Trout and the dipper seem to agree well together, for the most prolific trout stream that I know of in Cumberland is certainly the one on which you will see most dippers in the shortest distance.

I have a pet theory of my own, that when pile-wort (*Ranunculus Ficaria*) begins to bloom, the dipper begins to build. Now the pile-wort was in bloom on Feb. 6th, so to-day I snatched a few hours from business to see if the dippers were at work. Nor was I altogether disappointed, though I passed half-a-dozen pairs of birds, but only the favourite sites for building on the side of the river on which I was, yet I found one new nest about three parts finished, and watched one dipper for some time with a large piece of moss in its bill, so early does it breed. Of course this year it is earlier than usual, owing to the extreme mildness of the season.

In my walk this afternoon, it struck me from the present state of the Eden, that if the dipper did feed on salmon ova and fry, it would be a good thing for the river, and ought to be encouraged. Every few yards along the river I was passing dead or diseased salmon and grilse, and the loathsome and leprous look of the dying fish more or less enveloped in their living shroud of fungi, seemed a silent but strong protest against the over-legislation and preservation with which to every thinking person, the Eden is burdened. And this disease has been going on some time, as hundreds of fish have been taken out of the water and buried by the water-bailiffs: hundreds more which have been taken out by others than water bailiffs, while every tide of the Solway leaves its quota of dead fish upon the shores.

Another item connected with the dipper which was plainly to be observed to-day: if the Cynclus feeds upon salmon ova, as generally stated, we would expect at this time of year, when the spawning beds are full of eggs, to find it flocking there. But such is not the case, the birds being scattered impartially along the river without seeming to fancy any particular portion.

A SKETCH OF THE FLORA OF THE COAL PERIOD.

By Rev. J. Magens Mello, M.A., F.G.S., &c.

[*Continued from page* 159.]

Sigillaria. — We may turn next to the Sigillaria. Trees of this genus were also abundant in the swamps in the Carboniferous times, and a very large number of species have been described. The Sigillaria together with Lepidodendra and Calamites are considered by Professor Williamson to form an exogenous division of the vascular cryptogams. The structure of a Sigillaria is very peculiar and anomalous, but it is not often sufficiently well preserved for detailed examination. Some information is nevertheless obtained by means of its roots which were long thought to be the remains of independent plants and were accordingly named Stigmariæ. Indeed the fragmentary character of so much of the Carboniferous vegetation has caused much confusion in this way, different generic names having been frequently assigned to portions of one and the same plant. Although the Sigillaria has now been frequently found *in situ*, standing erect with its roots attached, the name Stigmaria is still retained for the latter for convenience, and besides this some Stigmariæ have certainly been the roots of other plants than Sigillaria, such as Knorria and Lepidodendron.

The structure of the root of a plant affords some clue to the structure of its stems, and so, could we be sure that in the case of a given Stigmaria we were dealing with the root of a Sigillaria, we should be able to arrive at some notion more or less definite regarding that plant. Fortunately the Stigmarian roots are often very well preserved, and good microscopical sections of them can be obtained. They are seen to be composed of a central pith of large polygonal vessels, longitudinally arranged, surrounded by a cylinder of scalariform tissue, this again is surrounded by a large cellular layer. The vascular cylinder is broken up by meshes through which passed the vascular bundles to the rootlets. No traces of medullary rays are found in the wood. This is Mr. Carruthers' description, yet he shows that the structure of the stem is precisely the same as in Lepidodendron, in which, however, as has been observed, Professor Williamson believes he has detected an appearance of medullary rays; these are supposed by Mr. Carruthers to be simply the vascular bundles supplying the rootlets or leaves as the case may be. Outside comes the bark, a thick cellular layer the external cells of which are smaller than those of the interior, and are fusiform. The whole of the vascular tissue of Stigmaria is composed of scalariform vessels, a clear proof that the true position of these plants is amongst the Cryptogams, although very various opinions have at different times been held upon the subject. By some writers they have been classed with the Coniferæ and by others with the Cycads. The leaves of Sigillaria have been described as linear in form. The trunks are fluted and marked with the long oval or pentangular leaf scars, which are more or less spirally arranged.

From the present condition of most of the preserved specimens it would appear that the inner parts of the trunk decayed far more rapidly than the outer, so they became hollow whilst standing, and flattened when they fell, so that we now find the bark of two opposite sides usually converted into bright coal, forming a double layer from half to one inch in thickness. Cylindrical portions of Lepidodendrous stems are far more frequently found than of Sigillaria, but when these latter occur in a more or less vertical position in the strata the circular shape is retained, and the bark having got filled up with sand or mud, gives us a perfect cast of the interior, whilst occasionally affording specimens of contemporary animal life.

The fruit of Sigillaria has been described and resembles very closely the Flemingites already mentioned, the only difference being that "the small sporangia are scattered in an irregular patch over the dilated base of an ordinary leaf, this leaf is moreover inserted into the stem almost vertically instead of horizontally, as in the case of the Lepidodendroid fruit;" and the *Sigillariostrobus*, as Schimper calls the fruit cone, bears both macrospores and microspores. Large quantities of the macrospores are not unfrequently found in great abundance in the beds containing Sigillarian and Stigmarian remains, they are also sometimes found in the interior of the trunks. The spores and sporangia of Sigillaria and Lepidodendron occur in such quantities in many coals that beds of considerable thickness are formed of but little else. Mr. Binney has described a seam some six feet in thickness almost entirely composed of macrospores. They have been found in splint coal in Fife, together with Stigmariæ and Sigillaria, in the Parrot coal of Armiston, and in Boghead coal; indeed, in each of the leading varieties of coal they abound. They occur in the Tasmanian resiniferous shale, forming from forty to fifty per cent. of the rock. Mr. Carruthers has suggested a way in which such enormous deposits of spores may have been formed by reference to the so-called sulphur showers produced by the shedding of the pollen in the Scotch and Norwegian pine forests.

To the extinct group of arborescent Lycopodiaceæ the fossil forms named Ulodendra, Halonia, Dadoxylon and others have been assigned. Halonia already mentioned as being possibly the fruit-bearing branch of a Lepidodendron has also been spoken of as the root of the same plant, although as the two have never been found in connection the question of its affinity must remain uncertain.

A genus of plants allied probably to Lepidodendron is called Lycopodites, and is characterised by its pinnated branches, with leaves inserted all round the stems in two opposite rows, but not leaving well-defined leaf-scars. Professor Williamson, as we have observed, groups the Lepidodendra and Sigillaria together with the Calamiteæ, as forming an exogenous division of the vascular Cryptogams, whilst the ferns form an endogenous division, "the former uniting the cryptogams with the exogens through the Cycadeæ and other gymnosperms, and the latter linking them with the endogens through the Palmaceæ."

Gymnosperms.—Remains of coniferous trees are tolerably abundant in coal from all quarters of the earth; some of these have been considered to have been allied to the Araucarian pines, others again to

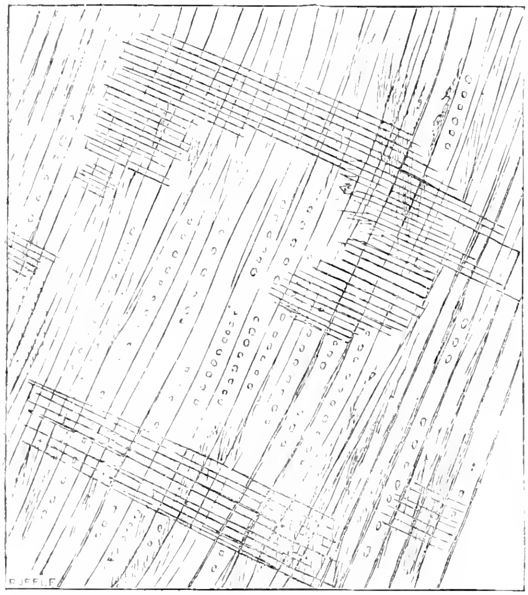


Fig. 122.—Fossil Coniferous Wood. Newcastle. Long. Sect. × 26 diam.

the yew family, but they chiefly differ from these in having large piths. The fossil called Sternbergia has been shown by Professor Williamson to have been the cast of the hollow cavity formed by the shrinking of the pith of some of these trees. The details of structure of coniferous woods preserved in the coal measures can be well seen with the aid of the microscope, and the minutest structure, such as the glandular discs, is clearly revealed.

Whether any true Cycadeæ have ever been found in the Palæozoic rocks is considered by Mr. Carruthers to be doubtful. It should not be difficult to determine the question, as the Cycadean stem and fruit have well-defined characters of their own. The trunks are well marked by leaf-scars, the leaves are pinnated in all the modern representatives save one, and have a single midrib, whilst the leaflets are marked by fine parallel, and sometimes forked veins. The fruit consists of nuts or seeds borne on scales, forming a cone of a more simple structure than that of the true Coniferæ. Some writers have considered that the Cycads are represented in the coal measure by the genera Nœgerathia and Cycadites, and possibly also by Psygmophyllum, and Cordaites; clearer traces of the early existence of this order of plants is found in the overlying strata.

Coniferæ.—Remains of Coniferous plants may be very readily recognised by the peculiar structure of the wood, this is characterised by the absence of dotted ducts, and by the presence of glaudular discs in the walls of its fibres; when these two characters occur in conjunction, we may safely consider the specimen under examination to be coniferous.

The earliest conifers with which we are acquainted are of an Araucarian type. The wood of this group of plants is marked by an absence of resin canals, and also differs from that of other conifers in the arrangement of the discs on the cell-walls of the prosenchymatous tissue. These pores when they form a single series are in contact, and form a straight line at the point of contact, when in several rows they have a spiral arrangement, and pressing upon each other take a hexagonal shape. The chief representative of the order, according to Schimper, in Carboniferous times, is a genus called Araucarioxylon, Kr., or Dadoxylon, Endl., but Mr. Carruthers claims Dadoxylon amongst the Taxoid conifers or yews.

Some curious and well-preserved nuts have been not unfrequently met with in the coal measures whose relationship has not yet been absolutely determined. Amongst these are some, which have been grouped under the name of Cardiocarpon, which may have been the fruit of the Dadoxylon. The appearance presented by well-preserved specimens of Cardiocarpon almost suggests the spikes of some flowering plant, and they have in fact been described as such under the name, Antholites. They have a "stout stem with interrupted ridges bearing alternate or nearly opposite bracts, more or less linear in form and in the axils of these bracts are flower-like leaf-bearing buds, from which proceed three or four linear pedicels to which is attached the fruit; this seems to have been a flattish and somewhat heart-shaped pericarp enclosing an ovate acute seed." *

Another fruit is a nut named, from its conical ridged shape, Trigonocarpon, which probably belonged to a tree of the same order as the Cardiocarpon; the fruit of the Chinese genus Salisburia is said to resemble it very closely. Sections of Trigonocarpon show that it had four cellular integuments enclosing an albuminous interior which is now represented by calcic carbonate; the integument of the fossil is very thick and, like that of the yew, may have been fleshy. The

* Carruthers.

Trigonocarpon had also an external sheath of an elongated form, giving to it, when this is preserved, an appearance suggestive of a diminutive cocoa-nut, enclosed in its fibrous pericarp.

Amongst the less definite forms of vegetable life preserved in the coal measures are many beautiful petioles, these are peculiarly abundant in some seams in the neighbourhood of Oldham, it is however impossible to say to what family of plants they belonged. One of the prettiest of these is *Stauropteris Oldhamia*, so-called from the star-shaped appearance of its vascular axis in transverse sections. One genus of these petioles, named Zeugopteris, has an axis forming in its sections a sort of double anchor. It is very possible that some of these petioles may have belonged to ferns.

This short sketch of some of the leading features of the Carboniferous flora is sufficient to have impressed upon us its peculiar character. It shows us that, long ages ago, a very strange type of vegetable life overspread immense areas of the globe. From the north pole to the south, over wide regions in the old world continents, and perhaps wider ones in the new, we see that during the lapse of enormous periods of time there must have existed vast tracts of low-lying ground, swamps and moist foggy plains, probably in many cases the deltas of great rivers, where in a warm damp atmosphere the forerunners of our horsetails and club-mosses attained their fullest development, and together with graceful tree-ferns reared their heads over perhaps as numerous species of lowlier growth, whilst dark pine forests clothed the sides of the neighbouring hills.

It was a period too of many changes: the earth was in a state of unrest, now slowly subsiding and allowing the waters to overflow and bury beneath their muddy and sandy sediments the growth of years; then again a tract here, or a tract there, would gradually rise from below the waters, to be once more clothed with vegetation, to be again in its turn submerged, preparing the way for a fresh growth, and so on from age to age.

But we need not suppose that the same species were always found together, nor that at each succeeding stage the same kind of plants reappeared.

Many species belonging to the Carboniferous period never grew together; change also and modifications of type took place then as in later ages. And during the long course of centuries old forms would disappear, to make room for newer which should occupy their place. At one time we might have seen ferns and Sigillarias flourishing over a district, when at a later date Lepidodendra and Calamites would alone be found. And even though there might not be any very great changes of genera still the species would be ever undergoing modification through varying conditions. In consequence of changes of this nature, we may now frequently find in one bed of rock a certain set of fossil species, whilst in an overlying one some only of these will be repeated, and with these we may find an introduction of new forms; and it has been remarked that but few species are continuous through the whole series of beds; it follows from this that a knowledge of some of the plants characteristic of the different horizons in the Carboniferous rocks, as well as of other organic forms would, in the absence of other indications, be highly useful to the mining engineer in tracing a seam of coal in an area that had been much disturbed by faults.

Summing up in conclusion the known number of species of plants hitherto found in the coal measures, we obtain the following approximate figures, worked out from Schimper's catalogue; to these some few more may have to be added, whilst on the other hand it is probable that, in more than one or two cases, fragments of one and the same plant have been separated by different names. That such a list, after all, should represent more than a fraction of the entire Carboniferous flora is more than we can suppose; large as the number of plants is that has thus been recovered, there must yet have been a still larger number of which no trace has as yet been found, of many of which, perhaps none, has even been preserved.

Orders.	Genera.	Species.
Fungi	1	1
Algæ	1	1
Equisetaceæ	6 (?)	24
Ferns	38	230—250
Lycopodiaceæ	12	187
Cycads (?)	2	2
Coniferæ	4	7
Doubtful Conifers or Cycads	7	56

Further research and study will doubtless enlarge the list, and a careful collection and investigation of the numerous remains that are constantly being brought to the surface in new sinkings for coal would most certainly abundantly repay any one who would devote the necessary time and attention to this most interesting branch of Palæontological research.

NOTES ON DAMPING THE PUPÆ OF LEPIDOPTERA, WITH OBSERVATIONS ON THEIR MANAGEMENT IN CONFINEMENT.

By William J. V. Vandenbergh, F.M.S., &c.

It has always been a disputed point with lepidopterists as to whether the pupæ of the majority of species of our lepidoptera require, or do not require, to be damped when in confinement.

It is undoubtedly a fact that by far the best way to successfully rear our pupæ is to place them in such a position that they may be, as far as possible, under natural meteorological conditions; but to carry this out thoroughly, is, to say the least, a matter of considerable difficulty.

The reason for keeping our captive pupæ in close confinement is obvious, and the consequent impossibility of keeping them invariably exposed to the weather under natural conditions must be equally clear. There is, however, no practical reason why, where the name and life-history of a species is perfectly known to the breeder, the pupæ should not be exposed under natural conditions* until within a few days of the date when the perfect insects may be expected to emerge; and I am of opinion that this method might with advantage be adopted to a much greater extent than it is at present.

It may be argued against this suggestion that some species are very erratic as to time in the emergence of the imago, but in such cases a sufficient margin of time should of course be left to render the loss of specimens by this means impossible.

The real difficulty we have to contend with is to find a place where the boxes will remain undisturbed, and not be subjected to the occasional predatory visits of centipedes and other dangerous intruders.

Even when the collector is prejudiced against completely exposing his pupæ to the weather, under the conditions before mentioned, the process may be modified to a considerable extent, and yet be used with advantage—such for instance as keeping the pupæ cages always in the open air.

It is a common thing for lepidopterists to keep their pupæ inside the house, and often in a room the temperature of which is usually several degrees higher than the outside air. This is a mistake which should be studiously avoided, as to it may be referred the loss to young collectors of many valuable specimens, to say nothing of the disappointment occasioned by their want of success. We need not go far for an explanation. The heated air of the room dries the pupæ to a much greater extent than is natural, and the inevitable result is that the pupæ case becomes unusually hard, and often unbreakable to the imago, which either does not make its appearance at all, or ultimately emerges deplorably crippled, as the result of ignorant and inconsiderate manipulation.

Dr. H. G. Knaggs, F.L.S., in his "Lepidopterists' Guide," p. 69, says, "I have long been satisfied that damping is as a rule a great mistake," but I hardly think the reasons † given by Dr. Knaggs sufficient to support such an opinion. Although there are numerous entomologists who endorse Dr. Knaggs' remarks, I think by far the greater number are in favour of damping, and I may safely say that the process is coming almost universally into use.

Some pupæ of course require much more moisture than others; take for instance the pupæ of *Callimorpha Jacobææ*, which, under natural conditions, pass the winter underground, generally in very moist and swampy places.

I have found the larvæ of this pretty insect in places where its pupæ must occasionally, during the winter months, become actually submerged in water; and the absurdity of keeping such pupæ in a dry place, without ever introducing any moisture into their cage, appears to me to be abundantly apparent.

A large proportion of lepidopterous insects pass the winter underground, in the pupæ state, and it is therefore evident that they must be influenced by rain, snow, &c., to a very considerable extent. Too much moisture should of course be avoided, as it is likely to produce "mould" and thus destroy our specimens; but any person would be able to regulate the supply sufficiently to avoid this undesirable result. During frosty weather, damping should of course be discontinued, as it would not be at all surprising if a collector who damped his cages during a frost, ultimately formed an opinion adverse to the process.

The plan generally adopted by lepidopterists, with insects that pass the winter in the pupæ state, is to keep them among layers of moss, &c., in a breeding-cage, or box, which is usually placed in an outhouse where it will be exposed to the natural changes of temperature and most other meteorological conditions, except rain and snow.

Towards the end of winter, when the weather begins to become warmer, and the amount of evaporation consequently greater, it is advisable to slightly damp the pupæ, which can easily be accomplished by sprinkling a little water on the surface of the moss, &c., with the aid of a house-painter's brush.

(*To be continued.*)

* Exposed to the rain, &c., in shallow open boxes, the cocoons being undisturbed as far as possible, and care being taken to have the bottom of the boxes abundantly perforated for the outlet of moisture, the accumulation of which would probably be fatal.—W. J. V. V.

† As I presume almost every lepidopterist possesses a copy of the invaluable "Guide," it is unnecessary to quote them here.—W. J. V. V.

NOTES ON SOME COMMON SEA-SLUGS.

By Dr. P. Quin Keegan.

THE great group of animals popularly called shell-fish (Mollusca), is one of the most interesting and most familiarly known departments of the kingdom of Nature. To the eye of childhood nothing is more fascinating than the beauteous and ever-varied shells which lie storm-cast in countless thousands on our sea shores; while to the man of science few researches are more instructive and impressive than that into the structure, habits, and economy of the flabby animals who have fabricated these shelly homes. Stored up in the cabinet, their aspect immediately carries away the thoughts to the sea, its many-murmuring voice, its keen freshness of air, its infinite tints and hues of colour and transformations of form. The Mollusca are found in the greatest numbers within the realms of the ocean. From the upmost high-water mark down to abysmal depths they abound in lavish profusion. Sometimes they lie buried deep in the sea-slime, sometimes they cling to or tunnel through rocks, or they cluster in the curls of the snaky seaweeds, or they embellish coral caves, or they lie scattered broadcast in countless myriads over the chequered floor of the ocean. They occur of all sizes from the dimensions of a hempseed to that of a man's head, from barely a line to over two feet in length, from barely a grain to four or five pounds in weight. Their forms are of infinite variety (some 20,000 recent species are known), their beauty is eminent, and they are endowed with a few anatomical structures, physiological features, and native instincts which suffice to place them in an exalted position among the invertebrata. In addition to the more

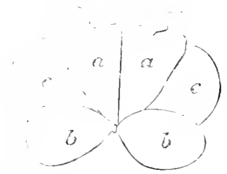


Fig. 123.—Principal nervous centres in Doris. *a a*, cerebroid; *b b*, branchial; *c c*, pedal—all communicating with one another by slits.

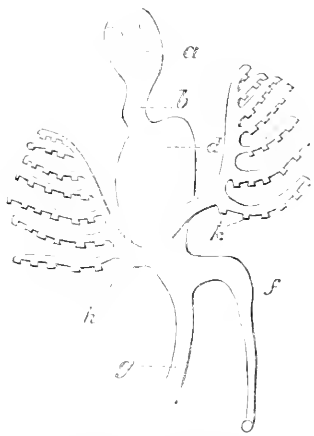


Fig. 124.—Upper portion of digestive organs of Eolis (after Hancock and Ambleton). *a*, buccal mass; *b*, œsophagus; *d*, bulb of stomach; *f*, intestine; *g*, great central canal, which ramifies into the papillæ; *h*, branches of great central canal; *k*, ducts from glands of papillæ.

general qualities of excitement, irritation, a desire of escape from danger, and a facility in sharing particular food, some species of this tribe exhibit a perception of time and of locality, and a capability of sociality and of concerted action. Many fight lustily for the protection of their ova, and construct a nest for them; some of the cuttle-fishes have been observed to make love right "spoonily," to exhibit rivalry, jealousy, and irascibility; and even to display attachment to their keepers, a jealous hate of intruders at aquariums, &c. Briefly we may recount that the Mollusca possess a distinct excito-motor and sympathetic nervous system with very scattered nervous centres, which control excito-motor, and probably sensori-motor movements; also they have five senses; muscular tissue (which frequently exhibits the transverse stripes of the voluntary muscle of the vertebrates); alimentary organs; an auriculo-ventricular (sometimes a portal) heart, with attached veins, sinuses, and arteries with colourless or pale blue corpusculated blood, and breathing organs to aerate it; they propagate by eggs, and generally the young undergo one larval stage of development.

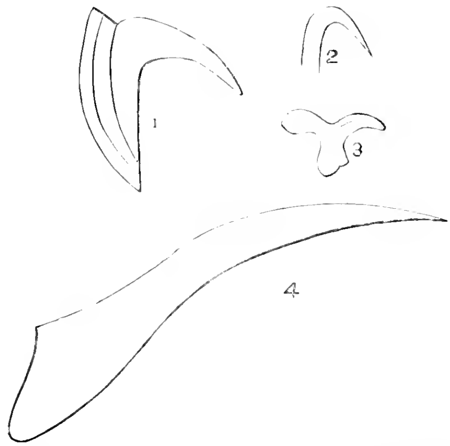


Fig. 125.—Teeth from palates of Doris. 1, *D. tuberculata*; 2, *D. Johnstoni*; 3, *D. pilosa*; 4, *D. bilamellata* (× 100). All magnified.

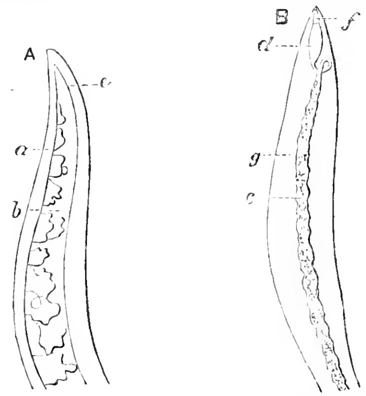


Fig. 126.—Diagram illustrating the difference between the Gill of Doris and the Papilla of Eolis. A. Gill of Doris; *a*, afferent blood-vessel; *e*, efferent blood-vessel; *b*, enclosed spongy tissue. B. Papilla of Eolis; *c*, gland lined with granular matter, loose or enclosed in large globules; *d*, oval chamber filled with bags of thread-cells; *f*, two narrow ducts whereby the thread-cells can be discharged externally; *g*, muscular tissue with blood-vessels.

To range over the entire field of investigation presented by these organisms, would in the space at our command be impossible. We propose, therefore, to offer a few remarks relative to the natural history of a group of Mollusca which are, perhaps, less popularly known than the other groups thereof, and which indeed require a special search in order to discover their whereabouts, or even their very existence. Most people know what shells are, and not a few epicures smack their lips right heartily on devouring the contents of some of them; but very few have the least suspicion of the reality of a tribe of creatures which, although comparatively insignificant in the magnificent repertory of marine animals, yield to none in respect to beauty of appearance and in delicacy, subtlety, and harmony of anatomical structure.

Frequently, when traversing the rough, rocky, weed-carpeted space that intervenes between high and low-water mark, we may observe a curious pale-orange coloured body like the frizzled half of a slightly squeezed lemon, and on taking it up and placing it

Fig. 127.—Palate of *Eolis Drummondi* (× 100). *a*, side view; *b*, front view.

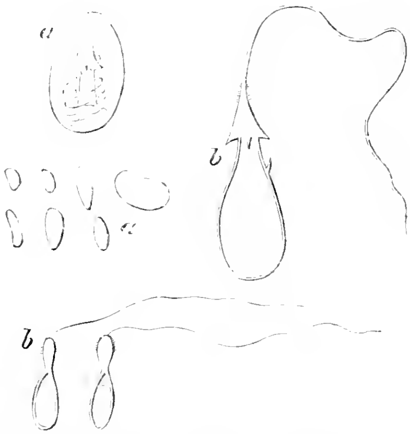


Fig. 128.—Thread-cells from Papilla of *Eolis Drummondi* (× 400–800), drawn by the Author. *a*, the thread contracted; *b*, the thread discharged.

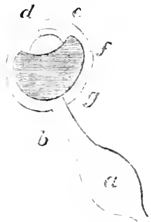


Fig. 129.—General structure of eye of Nudibranch. *a*, optic ganglion; *b*, optic nerve; *f*, general capsule; *g*, choroid; *d*, lens; *e*, cornea. Optic nerve traverses pigment layer to reach "rods and cones" in front of retina.

Fig. 130.—*Doris bilamellata*. Natural size.

Fig. 131.—Shells of embryo Doris. × 100.

Fig. 132.—*Doris tuberculata*. Natural size.

in a vessel of sea-water, behold a magic change! The half-lemon swells into "ship shape," and from near one extremity two laminated horns emerge, while from the other end an exquisite fresh-looking tuft of feathers gradually unfolds to view. This sedentary and sluggish organism is the *Doris tuberculata* of science. An anatomical dissection reveals the various structures which compose its vital machinery. In the first place, the excito-motor nervous centres are concentrated above the throat; three pairs of these are larger than the rest, viz. (1) the cerebroid ganglia, which are the most anterior in situation, and supply nerves to the tentacles, the mouth, and the lips; (2) the branchial, situated behind, supply the skin of the back and the gills; (3) the pedal, situated at the sides, which supply the whole foot. Besides these three, there are the olfactory, the optic, the buccal, the visceral ganglia, which are small, making in all about seven pairs of excito-motor ganglia and a single one, which send off about twenty pairs of nerves and four single ones to the various organs. In addition to these, there is a sympathetic system of nerves, which is extensively and beautifully distributed over the viscera, and is united by nerves forming plexuses and connected in front with the buccal and branchial centres, but there is no special relation between it and the blood-vessels, such as exists in the higher vertebrata. As regards the senses, it may be observed, that, in general, the nudibranchiate Mollusca are very sensitive to external influences, i.e., they are well endowed with general sensibility; the eyes, which, as seen in the young, are minute, immersed black dots behind the tentacles, are probably only sensible of light and darkness, not of colour or form; the dorsal tentacles are probably organs of some sense like our sense of smell; the oral tentacles and the lips are specially sensitive in all that regards the selection of food; and there is an apparent sense of hearing, the nerves of which seem to arise from the cerebroid ganglia.

The heart is situated near the upper surface of the body. It is contained in an envelope whereto is affixed a small ventricle, or portal heart, which impels blood in a pretty rapid current into the liver, ovary and kidney, and thence through the gills, and back again to the auricle, whence, having passed into the ventricle, it passes into all the viscera and the foot,* thence it oozes into the visceral sinuses and amid a network of sinuses (open spaces) in the skin, and returns to the systemic auricle by two veins. There is thus a double circulation of the blood, a systemic and a portal circulation; and the beautiful feathery gills subserve the sole purpose of aerating the doubly deteriorated blood that has traversed the kidney and the large and compact liver. The liver in fact is the largest organ in the body, so that on opening a sea-slug the most conspicuous object you perceive is some very bilious-looking matter; the interior seems all bile, which no doubt subserves essentially important purposes in the assimilating, digestive, and heat-producing economy of the animal. With respect to the digestive system, it may be observed that in Doris it consists of the following parts, lips, buccal mass (comprising a broad or narrow tongue, with sometimes a spiny prehensile collar added), &c., œsophagus, salivary glands, stomach (an ovate sac frequently buried in the liver), intestine (which is always short), pancreas, and an enormous liver.

Such is the general size, conformation, and disposition of the principal life-organs of *Doris tuberculata*; and these, with some variations and in different phases of development, prevail generally throughout the genus. About 100 distinct forms or species of this genus are known to exist throughout the world, and of these about twenty are recognised as British. Among the latter, *D. tuberculata* may be regarded as one of the commonest and most generally distributed. During the spring and summer it is frequently to be found between tide-marks, either close-closeted beneath some projecting eaves of rock, or stranded high and dry on the sands; and sometimes when during the autumnal gales it is hurled lifeless upon the beech by the wallowing seas, its cloak is observed to be extensively blotched with purplish streaks and patches. When in the adult condition it is about three inches or more in length. Its colour is extremely variable, owing no doubt to the varying condition of its liver; but when in health it is of a yellow-ochre tint. The body is rather depressed, being not nearly semi-globular, and the upper or convex surface is completely studded with small pimples or warts of different sizes. The branchial plumes are very large, eight in number united at the base, tripinnate (thrice feathered) and surround a prominent tubular vent. The cloak is stiffened especially around the flanks by long, rough, spindle-shaped spiculæ, some of which are slightly bent at or near the centre, and bluntly-pointed at the ends. The tongue of this species is, when expanded, about half an inch square, and the whole of this small area bristles with minute spines, which number about 6000, and are shaped somewhat like the spines of the dog-rose. This organ is bisected into two equal parts, each of which carries some forty rows of seventy-two teeth, only eighteen of which rows are ever on duty for grasping the sponges on which the animal generally dines. The teeth when magnified are seen to be stout, uniform in shape, strongly hooked, and marshalled in such a way that they look like as many rows of pegs on which a liliputian hat might be hung.

(To be continued.)

* In most molluscs some part of an excretory organ, called the "organ of Bojanus," is in close relation with the veins near the heart, and serves to eliminate the nitrogenous waste from the body.

A GEOLOGICAL EXCURSION TO SWITZERLAND.

By Dr. Rudolf Haeusler.

[*Continued from page* 13.]

Part II.

Molasse Quarry of the Kalofen.

These beds represent the material deposited along the coast of an arm of the molasse sea, the ripple-marks being often very distinct. They contain washed-in fossils of the jurassic rocks which formed the cliffs of the miocene sea. With the exception of a few molluscs, fossils are scarce, being almost entirely broken by action of the waves.

Near Umiken thick banks of conglomerates alternate with the molasse-beds, which in this locality are full of oysters. On returning to Brugg, and crossing the railway bridge, a bed of ferruginous (*eocene*) marl containing flints with upper jurassic fossils, is worth visiting. Lower down, near the town, below the Freudenstein, the vertical cliffs consist of limestones belonging to the zone of *Am. Achilles*, with numerous bivalves (*Phol. scutata*, *Thracia suprajurensis*, &c.). They are covered by the more local Letzischichten, with *Balanocrinus subteres*, *Pholadomya cor*, &c.

From Brugg, an excursion to the famous Schambelen, in the valley of the Reuss, can be finished in a few hours. Take the main road to Mülligen, passing the old monastery of Königsfelden (with fine stained windows and the cell of Queen Agnes) and the new cantonal lunatic asylum and hospital. The road on the left side of the river cuts a series of triassic and jurassic rocks, amongst which the following can easily be recognised by their characteristic fossils. The Lettenkohle is represented by:—1. Dolomitic limestones with *Gervillia socialis* and *Myophoria vulgaris*; 2. Alum slates with *Estheria minuta* and *Lucina Bronni*: 3. Bone bed with *Saurichthys Mougeotti*, *S. acuminatus*, *Acrodus Gaillardoti*, &c.

4. Dolomitic bituminous Schieferkohle, with *Bactryllium.* In the first small pit the celebrated insect marls were worked by the Swiss Natural History Society, but are now covered by fallen down clays and alluvial mud, so that the rare fossils are only obtained by removing great masses of clayey material. Fragments of insects and crustacean molluscs (*Lima*, *Cardinia*), parts of echinids (*Diademopsis Heeri*) and crinoids are occasionally met with. The hard limestones above with *Gryphæa arcuata*, *Am. Bucklandi*, &c., represent the different zones of *Am. Bucklandi*, *Geometricus*, *Pent. tuberculatus*, *Am. obtusus*, *A. raricostatus*. In the second larger pit the bituminous marls of the Aalenian (with rare specimens of *Am. opalinus*) are worked as "nieten" for the fields.

A small road in a westerly direction in the wood cuts the Bathonian and lower Argovian rocks.

At Mülligen a few banks of Muschelkalk with *Encrinus liliiformis* are exposed. From here, or better from the Schambelen, the hills on the opposite side of the river show interesting orographical features caused through erosion.

Cross the river Reuss at Mülligen (ferry), ascend the vineyards "Nettel" above the village of Birmenstorf, in which the lower Argovian étage (Birmenstorfer Schichten = zone of *Am. transversarius*) is very fossiliferous (*Am. plicatilis*, *A. Arolicus*, *Ter. bisuffarcinata*, *nucleata*, *Rhynch. Arolica*, &c.). Fossils are often offered for sale (Note 1). On the top of the hill, near the "Signal," the Bathonian and Callovian are visible. In the meadows deep wells are sunk in the Trias to extract the sulphate of magnesia (Birmenstorfer Bitterwasser).

Return to Brugg along the right side of the river Reuss. The whole plain covers the ruins of the old Roman town Vindonissa. Coins, tiles, with the inscriptions of the legions XI and XXI, pieces of pottery, &c., are sometimes offered for sale by the farmers.

From Brugg take the main road to Remigen, across the Brugger Berg, follow the south slope of the Geissberg on the road to Büren. The vertical rocks, called Kammerfels, are formed by the typical Geissbergschichten with numerous species of bivalves, *Pholadomia canaliculata*, *Goniomya litterata*, *G. constricta*, *Thracia pinguis*, *Card. intextum*, *Perna mytiloides*, *Ostrea caprina*, &c. A few yards in an easterly direction the road cuts the unfossiliferous Effingerschichten, and below the crucifix the very fossiliferous Birmenstorfer Schichten. The following species will enable the geologist to recognise the zone: *Bel. hastatus*, *Am. Arolicus*, *A. canaliculatus*, *A. hispidus*, *A. subclausus*, *A. callicerus*, *A. plicatilis*, &c. They overlie the ferruginous marls of the Callovian, and these the limestones of the Bathonian (*Rhynch. varians*) and great oolite. Near Gansingen, in the sandstone quarry (Sandsteinbruch), the Keuper sandstones with equisetum form the base of the interesting dolomitic limestones with *Avicula Gansingensis*, *Myophora vestita*, *Turbonilla Gansingensis*, &c. In the neighbourhood, chiefly along the Rhine, many localities are famous through the development of the Muschelkalk and Keuper formation, but difficult to find without perfect knowledge of the local geography. The upper Muschelkalk can be seen at Kaisten, where it contains *Turbonilla ornata*, *Myophoria rotunda*, *M. Goldfussi*. The Hauptmuschelkalk with *Ceratites nodosus*, *Pemphix Sueuri*, *Encrinus liliiformis* is traceable at Etzgen, Laufenburg, Stein.

From Gansingen, a short excursion to the Waldsee in the Black Forest, well known through the "Trompeter von Säckingen," can be done in a few hours by taking the road to Stein, crossing the Rhine to Säckingen, and will show a piece of the peculiar beautiful scenery of the Black Forest. Return to Stein and take the last train to Brugg. The railway runs through the whole Jura of the canton Aargau, and many important stratigraphical features can best be seen by passing along from Frick to Effingen, and at the other end of the Bözberg tunnel, with its magnificent view of the Aare valley, molasse hills, and Alps.

Instead of this excursion, the following would be of more interest concerning the jurassic formation. From the above-mentioned Kammerfels, take the road to Hottwyl, after having visited the rocks of the Geissberg and the Birmenstorfer Schichten near the Crucifix. Visit the quarry on the top of the hill of Hottwyl, where the contact of the Bathonian, Callovian and Argovian is very well shown. From the old ruin the view of the Rhine valley, Black Forest and jurassic chain is very instructive, showing good examples of denudation and erosion valleys on a large scale. Descend to Mandach, cross the Egg mountain, where the Upper Dogger and Lower Malm are seen in a section along the road. The view from the Alps, Molasse plain and hills, Jura, Black Forest is one of the finest in the canton. Near Villigen the Lower Malm is again very fossiliferous. Follow the road to Lauffohr; from here several important features in the stratigraphy of the "Jura" can be observed (Besserstein, Rhyflue, Gebenstorferhorn). The road passes near the ruin of Freudenau on the bank of the river Aare. At Lauffohr a quarry is opened in the Lower Sequanian rocks (zone of *Am. bimammatus* or *Hemicidaris crenularis*) with *Pleuromya recurva*, *Phol. canaliculata*, *Ph. paucicosta*, *Cyprina Argoviensis*, *Terebratula Moeschi*, *Rhabdocidaris caprimontana*, &c. Near the village, the three principal rivers of the canton, Aare, Reuss, and Limmat, unite. Follow the foot of the Brugger Berg to Brugg.

This excursion, which, if properly finished, is one of the most satisfactory, may be altered so far, that, if time permits and the trains suit, a boat may be taken from Stilli to Betznau, where the cliffs show one of the finest profiles of the lias and Dogger, but *only* accessible at very low water.

With the help of the following notes the different strata can be easily recognised, although careful examination of the often decomposed surface of the rocks is required.

The succession of zones from S. to N. is :

Zone of	
Rhynch. varians . .	*Rh. varians*; *Rh. spinosa*, &c.
Am. Parkinsoni . .	*Bel. canaliculatus*; *Am. Parkinsoni.*
Am. Blagdeni . . .	Feebly developed.
Am. Humphriesianus	With numerous spec. of *Stephanoceras.*
Zoophycos scoparius .	*Z. scoparius*, common.
Am. Sowerbyi . . .	*O. flabelloides*; *Panopæa*; *jurassica.*
Am. Murchisonæ . .	*Pecten saturnus*; *P. pumilus.*
Am. opalinus . . .	Bituminous blackish marls, with few fossils.
Am. jurensis . . .	*A. jurensis* and its allies.
Am. serpentinus . .	*Am. communis*; *Bel. acuarius*; *Inoceramus dubius*; *I. cinctus.*

The fossils washed out by the river are usually mixed up and found along the shore at very low water.

Take rail to Turgi and Brugg.

Cross the Birrfeld to Braunegg and Othmarsingen, where extensive quarries in the molasse sandstones are opened. The fauna of the Helvetian étage is represented by numerous fossils of Ficula condita, *Turritella turris*, *Mactra triangula*, *Cardium commune*, teeth of Lamna, Carcharias, Notidanus ; good specimens can be bought from the workmen at moderate price. Unused blocks, having been exposed to the rain, yield a collection of the principal species in a short time.

The following table will assist to compare the zones of the Aargau with those of other countries :

DOGGER.

Zones.	Aargau.	Corresponding zones in Germany, &c.
Callovian. . .	II. Ornaten., Sch. .	*Am. anceps.* *Am. athleta.*
	I. Macrocephalus, Sch.	*Am. macrocephalus.*
Bathonian . .	II. Varians, Sch. .	*Rhynch. varians.*
	I. Hauptrogenstein (*Ostrea acuminata*)	*Am. Parkinsoni.*
Bayocian. . .	III. Humphriesianus, Sch.	*Am. Blagdeni.* *Am. Humphriesianus.*
	II. Sowerbyi, Sch. .	*Am. Sowerbyi.*
	I. Murchisonæ, Sch.	*Am. Murchisonæ.*
Aalenian . . .	I. Opalinus, Sch. .	*Trigonia navis.* *Am. torulosus.*

LIAS.

Zones.	Aargau.	Corresponding zones in Germany, &c.
Toarcian . . .	II. Turensis, Sch. .	*Am. radians.* *Am. jurensis.*
	I. Liasschiefer . .	*Est. (Pos.) Bronni.* *Am. serpentinus.*
Charmouthian .	II. Margaritatus, Sch.	*Am. spinatus.* *Bel. compressus.*
		Am. fimbriatus. *Am. Davoei.*
	I. Numismalis, Sch.	*Am. Ibex.* *Am. Jamesoni.*
Sinemurian . .	Gryphitenkalke,	*Am. raricostatus.* *A. oxynotus.*
	or	*Am. obtusus.*
	Arcuatenkalke (*Gryphæa arcuata*)	*Pent. tuberculatus.* *Am. Bucklandi.*
Hettangian . .	Insect marls . . .	*Am. angulatus.* *Am. planorbis.*
Rhaetian.		

Note 1. As from the description of fossils given by the labourers or boys it is easily possible to be deceived, a list of the local names of the more common genera may be useful, and prevent disagreeable disappointment.

Fossils are called Versteinerungen or Figurensteine.

Ammonites =	Ammonshörner, gewundene Schnecken.
Belemnites =	Tüfelsfinger (Germ., Teufelsfinger). Donnerkeile.
Terebratula . .	Tübli (Germ., Täubchen). Hüendli (Germ., Hühnchen).
Rhynchonella .	Räbhüendli (Germ., Rebhühnchen). Chraisacherhüendli (Kreisackerhühnchen).
Pholadomya . .	Härze (Germ., Herzen).
Goniomya . .	Oepfel (Germ., Aepfel).
Cardium, &c. .	Kälberfüss, from a certain resemblance of *Phol. paucicostata* to the foot of a calf.
Turritella . .	Schrubestei (Schraubensteine).
Turbo. . . .	Schrubestei (Schraubensteine).
Cidaris . . .	Chröhndli (Germ., diminut. of Krone).

Crystals of calcite are sometimes called teeth ; other fossils or often merely rolled pebbles are not seldom offered as heads of men or animals, fossil fruits, fish, as in other countries. It is still an almost general belief amongst the population of the small villages that fossils are still growing in the rocks or were created in them, and it is surprising how these people stick to this opinion simply because their fathers believed the same. As the geologist is generally obliged to wander in the loneliest parts, he will find difficulties in making himself understood even if he speaks German well. A small coin is often of greater help than the best dictionaries or guides for travellers.

The country people of the canton Aargau are as a rule very good-hearted, and will give the little information on geological subjects with pleasure. They are liberal, and not likely to cheat foreigners as their more refined brethren of the Alpine cantons do. I should advise geologists to accept the invitation to their old-fashioned houses, in spite of many objectionable things. Milk or wine is generally offered, and the latter, although not exactly equal to Olympic nectar, is certainly far superior to the liquor obtained on some parts of the lake of Zürich from vines, the berries of which are so "hard that during the French invasion they did duty as bullets for the guns," and which the possessors of very little better sorts of wine on the same side of the lake say is not transported by the railway companies for fear that, a barrel being broken, it would dissolve the rails. It is of great importance to have a recommendation to a native geologist.

WATER-SPIDERS.—I found three of the true water-spiders. I have always kept them in a separate aquarium. What do they live on, and will they live peaceably with fish, newts, &c., and will fish, newts, &c., live peaceably with them ? I shall be glad of any information from any one who has kept them, as to their habits, &c.—*John Alexander Ollard.*

MICROSCOPY.

VOLVOX STELLATUS.—In a pond in Epping Forest, on 20th of May last, I was fortunate in finding the *Volvox stellatus* of Ehrenberg. I believe this rare form of volvox has not been found in England for the past twenty years at least, but if it has I should be glad to know from any one who has found it, when and where it was, as I cannot find any description of it more recent than in Pritchard, other articles being evidently borrowed. My own observations, made within an hour after taking them, lead me to differ somewhat from the conclusion there put forth. It was evidently a very favourable opportunity, for while examining one with × 150 it burst, giving forth a multi-

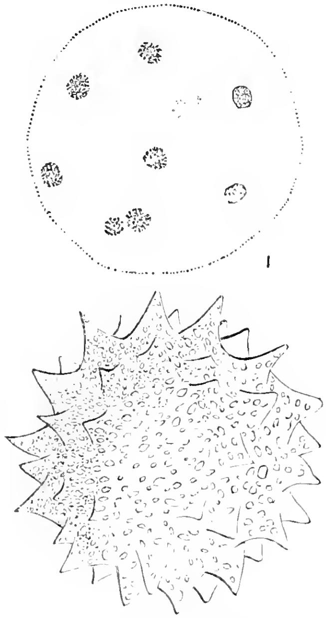


Fig. 133.—1, *Volvox globator*, containing *V. stellatus*; 2, *V. stellatus* = $\frac{1}{3000}$ in.

tude of microgonidia, thus showing that it was filled with them and that they were not as in *V. globator* only on the periphery. The stellatus forms occupy the same places in the globator as the ordinary gemma, but do not grow to the size of the young globator. It will be understood that the sphere is covered with the conical protuberances, and that it has no internal marginal sphere, some of the gonidia being inside the cones. They do not appear to be provided with cilia, as I could see none, and they had not the usual rolling motion, but merely floated out of the mother cell as it broke up and soon afterwards discharged their contents. I am led to believe that the stellatus is a form taken by the volvox in an alternation of generations; that is, having passed through its other various forms of increase, then at certain seasons which are conducive it acquires this stellatus form which being filled with gonidia (?) would thus help to increase them to a wonderful extent.—*James D. Hardy, Clapton.*

THE SIGN ×.—Why does T. J. R. maintain that this sign means more than amplification? I cannot call to mind any instance in which it is used in any other or additional sense. Let us examine his own example, he says that a $\frac{1}{15}$ with an eyepiece, × 500 diam. he examines an object with it, and finds many markings brought out. This he considers represents the object perfectly as × 500 diam., but supposing that a $\frac{1}{10}$ is constructed which shows many more details, would he be correct in saying that the former glass no longer × 500 diam. or that the new $\frac{1}{10}$ × more than 500 diam.? With both glasses the ·001 of an inch on a micrometer appear of equal length ($\frac{5}{10}$ of an inch). If T. J. R. is correct, then the microscopes of 1782 had no magnifying power at all. Resolving power is not dependent on amplification (within certain limits), but first on the angle of aperture, second the obliquity of the illuminating beam. Suppose we try a specimen of *Pleurosigma formosum* using the $\frac{1}{10}$ and direct light, the dots are brought out admirably, therefore it is × 500 diameters, for the Pleurosigma we substitute *Navicula rhomboides*, we see the margins and the median line sharply defined, but no trace of lines crossing the valve; we throw an oblique ray upon it and we find that the object has lines crossing it longitudinally and transversely. We alter the position of the valve, and the supposed lines are resolved into dots. Is the magnifying the same in every case, or does the 500 diam. for Pleurosigma become less when rhomboides is examined under the same conditions and again becomes 500 when oblique light is used? Magnifying power is not a variable quantity; a one inch must always magnify 10 diameters, and if we combine an ocular with its × power, is 10 × by the power of the ocular at any given distance from it, whether $\frac{1}{100}$ is × by 5 or $\frac{1}{10}$ by 50, the result as far as magnification goes is precisely the same. The ·001 of an inch was the apparent length of $\frac{5}{10}$. I am of course taking 10 inches as the standard distance of perfect vision. —*Fred. Kitton.*

CUTTING COAL SECTIONS.—Please correct error in my remarks on this subject, for 2nd method read "incineration" instead of "maceration." Professor Reinsche's sections of *coal* are opaque with the exception of the organic remains contained in them, which are of the colour of amber.—*F. K.*

SECTIONS OF COAL.—It seems funny that your correspondent should talk of easily making sections of coal which evidently are not real coal at all. Any one with the least knowledge of chemistry, can at once say that the plans given for softening coal previous to making sections, could not succeed; but it is curious how, in this, as in a good many other cases, books and writers copy from one another without proving what they assert. It is most sadly the case. As to making sections of real coal, it can be done, but it is not very easy.—*Edward Thomas Scott.*

Cutting Sections of Coal.—I am thankful that Mr. Kitton has seen the "joke" in my last communication. I was rather afraid he would not, as it told so heavily against himself. I am quite familiar with the works of Reinsch, and on referring to the papers which speculate on the microscopic examination of coal, I find that he admits but little is to be seen. I am therefore still of opinion that in the more mineral forms of coal no actual structure can be detected; and I am glad to see that Carpenter, E. Holmes, and all your more advanced microscopists are of the same opinion. It would, therefore, be as necessary to add in the pages of the Micrographic Dictionary "that this process is not successful with anthracite or hard coal in the mineral state," as it would be to add at the end of a recipe for treating delicate vegetable tissue, "this process will not succeed with a brickbat."—*C. H. Griffith.*

The Postal Microscopical Society.—We have received number two of the new journal of this society, full of interesting matter to the naturalist and microscopist alike, some of the papers giving the results of original research. This journal supplies a want, and therefore we wish the illustrations of the present number were more artistic.

Studies in Microscopical Science.—These weekly publications, edited by Mr. A. C. Cole, are each illustrated with one coloured plate, which so far have been remarkable for their high artistic finish. That in number seven for instance, giving a coloured section of the spinal cord of a cat, is equal to, if not beyond anything of the kind yet attempted.

Manual of the Infusoria.—Part VI. By W. Saville Kent, F.L.S., &c. (London: David Bogue). We have received the concluding part of this magnificent work, which has grown beyond original contemplation, the present part being nearly twice as large as any of its predecessors, although its price remains the same. We congratulate author and publisher alike upon the completion of a work which is not likely to be attempted again. To naturalists who work with the microscope and use that instrument as a means of gaining fresh knowledge, this book will be very precious. It comprises nearly one thousand quarto pages, which are illustrated (besides woodcuts in the text) by thirty-two plates, averaging about fifty figures to each plate. The work is inscribed to Professor Huxley, in very appropriate language, and Dr. Huxley cannot but feel proud of the honour done him by his distinguished pupil. It will be but a short time before this book has increased in money value; for, all things considered, it is by far the cheapest and most comprehensive work connected with Microscopy we have ever seen.

Origin of Jet.—Whatever may be the origin of jet, or the reason why we find it as we do, of one thing I must assure Mr. Dotchon, that a great deal of it was formerly some kind of firwood. I have various sections in which the grain of deal and the grain of the jet are curiously alike. I have also sections in which the fir glands are just as visible as in a fresh piece of deal. I have three sections of the same bit of jet, but in different directions which are interesting; but I don't by any means intend to say jet is never found without the woody structure being evident.—*Edward Thomas Scott.*

On the Mounting of Molluscan Palates for the Microscope.—All the microscopic treatises that I have consulted, despatch the mounting of molluscan palates in a very summary manner, as if the process was very simple. To obtain a really clear and well-mounted palate is, however, by no means easy. Two requisites are indispensable, viz., the tongue must be perfectly clean, and it must be made as transparent as possible. Some authorities say that it ought certainly to be mounted in fluid, and they contemptuously controvert other equally worthy authorities who prefer to mount it in balsam. Now, any palate can be effectively mounted in balsam provided only that the palate be thoroughly clean. And this is no simple or easy matter. My process is as follows, and it seems quite sufficiently, if not completely successful. After removing the tongue from the animal, I immediately immerse it in a rather strong solution of caustic potash for not less than twelve hours. I then remove it, place it on a slide, and with a large and good camel-hair brush (the "goose" size is the proper thing) and water, carefully remove every trace and particle of the muscular or fibrous matter with which it is covered on every side. It is surprising what a quantity of "stuff" will come away with proper manipulation. Some times the solution of potash will require to be used with the brush in lieu of plain water; and small fibres, as they appear at the edges of the organ, must be removed by the needle. The work must be frequently examined by the hand lens and the microscope, so that every atom of dirt may be seen in time and removed. After half an hour's vigorous and careful brushing, if the palate lies perfectly flat upon the slide, with no crumpling at the margins, and if to the naked eye and under the microscope it looks perfectly spotless and clear, then, and not till then it may be pronounced thoroughly clean. Of course some of the stouter palates may be boiled for several minutes in the potash solution, and no doubt some are more difficult to clean than others, and may require a second immersion in the alkali, but the most careful and effectual manipulation is requisite even in these cases. Having thoroughly washed it in pure water, it is placed in position in the centre of a clean slide, a small piece of clean linen is placed over it, a piece of glass surmounted by a small leaden weight over that, and the whole left for some hours to dry. On carefully removing the linen cloth, a few drops of carbolic acid are let fall upon the dried palate and allowed to remain for some minutes. Now drain away the acid, and very carefully and slowly, without overheating, dry the subject over the spirit lamp, holding the slide three or four inches above the flame. When once more dry, apply in the same way a few drops of benzole, which you dry slightly, and then you mount it in balsam and benzole or in dammar in the usual way. With some thickish palates a thin metal or pasteboard cell will be found convenient (if of pasteboard, it must be steeped in turpentine for some time previously). Having adjusted the thin glass cover, fasten it to the slide by very carefully winding around them some very fine copper wire. This is much better and more simple than the use of spring clips, &c. The process is completed by drying over the hot-water bath, and cleaning the slide in the usual manner. I have now before me under a one-inch objective a mounted palate of *Trochus zizyphinus* prepared by the foregoing process, and I defy any "professional" mounter to exhibit anything more clearly aud lucidly beautiful. The denticulations of even the smaller uncini are here revealed with admirable distinctness, precision, and beauty. With regard to mounting media, I have heard it stated that calcareous plates, spiculæ, &c., mounted in pure balsam ultimately become corroded. Can any reader of SCIENCE-GOSSIP throw light on this matter?—*P. Quin Keegan.*

ZOOLOGY.

THE INTERNATIONAL FISHERIES EXHIBITION.—This exhibition will be opened in London on May 1st, 1883, and will remain open for a period of six months. The class list of exhibits brings within its range every object having even a remote connection with the primary subject of fishes and fishing. The first and largest class is that showing different modes of capturing marine and freshwater animals of economic value; under this head are included fishing craft of all nations, the equipment of fishing vessels, methods of signalling at night, and of communication, life-boats, &c. Class 2, is headed: "The Economic Condition of Fishermen," and comprises personal equipment, food, dwellings, and all relating to the carrying on of their trade. The third class: "Commercial and Economic," is one of the most important, including as it does the preparation, transport, and utilisation of fish. From a scientific point of view the fourth and fifth classes are the most interesting, being appropriated to fish culture and natural history, in the latter being comprised specimens of fish of all kinds, together with their friends, foes and foods. Class 6 includes the history of, and literature relating to fish. Last, not least, is the announcement of five subjects for essays on fishes, fisheries, and the supply of fish, for the best on each of which will be given a prize of £100. Applications to exhibit are to be sent in before the 1st September, 1882, and the essays before May 1st, 1883.

"THE BUTTERFLIES OF EUROPE."—By Dr. H. C. Lang, F.L.S.; London: L. Reeve & Co. Part VII. of this work is published, with beautiful plates of insects, their larvæ, and food-plants.

THE BRITISH ASSOCIATION will hold its fifty-second annual meeting at Southampton, commencing on Wednesday, 23rd of August. The neighbourhood is a very attractive one, both for scenery and natural science, including the Isle of Wight and the New Forest, rich geologically, entomologically, and botanically, so that we expect there will be a large gathering. The president will be Dr. Siemens, F.R.S., whilst the presidents of sections will be as follows: Physical Science, Lord Rayleigh; Chemistry, Professor Liveing; Geology, Professor Etheridge, F.R.S.; Biology, Professor Gamgee; Zoology and Botany, Professor M. A. Lawson; Anthropology, Professor Boyd Dawkins; Geography, Sir R. G. Temple; Economic Science, Right Hon. G. Sclater-Booth; Mechanics, John Fowler, C.E. A discourse on "Pelagic Life," will be delivered by Professor Moseley, and another by Sir William Thompson. Numerous excursions to places of scientific interest in the neighbourhood are arranged for.

"WESTBURY HOUSE SCHOOL EPHEMERIS."—We are always pleased to notice the self-exercised efforts of our public schools to work the natural history of their immediate neighbourhoods. The above publication is a capital illustration of how this can be done, for it gives lists of Worthing shells, mosses, grasses, sedges, fishes, &c., as well as notes on local fossils, &c.

"THE FIELD NATURALIST AND SCIENTIFIC STUDENT."—Under this title we have to welcome a new literary *confrère*, published in Manchester, by A. Heywood & Co. The articles are all of a high class, and the general tone and style of the publication cannot but make it welcomed by all naturalists.

THE LAMBETH FIELD CLUB.—The tenth annual report of this club just published gives a very ful list of outings for the present summer, chiefly in the neighbourhood of London; the report shows the society to be in an intellectually healthy state. The catalogue of its library includes all the chief books of the day in natural science.

BOTANY.

How the Fuchsia is fertilised.—This well-known flower is pendulous, and the stigmatic enlargement of the style is considerably below the anthers. This arrangement was formerly considered to facilitate the fertilisation by allowing the pollen to drop from the anthers to the stigma. As a matter of fact, however, the stigmatic surface is below and would not be affected by a shower of pollen from above. The flower is fertilised by humble-bees, which alight on the style and climb up over the anthers, pushing their heads under the petals to reach the honey. In doing this the bees' abdomen is first pressed against the very viscid stigma and afterwards against the anthers. From the anthers a considerable quantity of pollen is gathered on the hairs of the abdomen, and on visiting another flower this pollen becomes attached to the stigma. Cross-fertilisation is insured by the bee coming in contact with the stigma as soon as she has alighted with pollen from another flower. She never returns to the stigma after passing over the anthers, but flies off from the upper parts of the flower. At first sight the fuchsia seems to offer no special facilities for cross-fertilisation, although the position of the stigma demonstrated clearly that self-fertilisation does not occur. In company with my friends, Messrs. D. Houston and W. H. Mills of the Birkbeck Institution, I recently had the good fortune to see several bees at work on these flowers, the details, as given above, affording us much pleasure. The quantity of pollen placed on the stigma at each visit was considerable, and I should think sufficient to fertilise a dozen flowers if used economically.—*Edward Step, Putney.*

Pansy.—As I have not seen mention made of some interesting points in the structure of the flower of the pansy (*Viola tricolor*), I venture to point out these peculiarities, induced by the statement made by Sir John Lubbock in "British Wild Flowers in relation to Insects," that "In *Viola tricolor* the form of the stigma is very different from that of *Viola canina*, but the reason of the difference has not been satisfactorily explained." *Viola tricolor*, unlike the other members of the genus, does not produce cleistogamous flowers; some special contrivance for ensuring the valuable process of cross fertilisation might therefore be expected, and such is to be found. The style of *Viola tricolor* is short, slender and curiously bent at the base. The stigma is large, capitate, and hollow with a rounded opening from the lower side of which there is a projection, it is bearded on both sides behind the projecting portion. The entrance to the spur is completely closed by the stigma with its projection and beard (in the other violets the access to the spur is quite open). The passage to the spur consists of a channel lined with hairs. The membranous expansions at the anther tips do not completely overlap all round as in other violets, but are deficient at the part overhanging the hair-lined channel. The use of these arrangements is evident. When the anthers ripen and discharge their pollen, the pollen falls through the orifice at the anther tips and is received and retained in the hair-lined channel, it is prevented from leaving the flower or reaching the stigmatic surface (which is on the interior of the stigma) by means of the hairs and the position of the stigma already described. A powerful insect like the bee can elevate the stigma, which operation is rendered easy by the bend of the slender base of the style, and thus gain access to the spur where the honey is secreted before reaching it. The bee must push its proboscis through the channel with its store of pollen, some of which will adhere and be carried away. On visiting the next pansy, the bee, in its endeavours to reach the honey, will inevitably insert its proboscis with the adherent pollen into the interior of the stigma, through the opening which lies directly in the way.—*Thomas W. Ogilvie.*

Ladies'-traces.—I believe ladies'-traces, in the olden time, were white silken cords. with which the fairer sex drew together parts of their dresses. Tresses I understand to be hair flowing naturally, in waves or ringlets, and not "braided hair." This seems to be the idea of classical writers. Moore says:—

"The young village maid, when with flowers she dresses
Her long flowing hair for some festival day,
Will think of thy fate, till, neglecting her tresses,
She mournfully turns from her mirror away."

And, again, Shelley.

"Her golden tresses shade
Her bosom's stainless pride,"

Could hardly be said of "braided hair." Unless Mr. Kitton's view (p. 89) is supported by direct evidence, I submit that ladies'-traces is much more likely to have been the early common name of *Neottia spiralis*, than "lady's tresses."—*Thomas Mechan, Germantown, Philadelphia, United States.*

Occurrence of Polypodium calcareum in Sussex.—On the 4th of June, I had the pleasure of seeing this fern in some quantity growing on the northern slope of one of the Sussex Downs, where it had been accidentally discovered a few weeks before by a rabbit shooter, who, missing his footing, rolled down amongst it. So far as I know, it has not yet been recorded in Sussex. Wiltshire alone has hitherto represented it in the Channel district. It appeared to be confined to a very limited area, distant nearly two miles from any habitation. For obvious reasons its precise locality is not here mentioned.—*F. H. Arnold.*

"Revue de Botanique" is the title of the new monthly publication of the French Botanical Society just issued.

GEOLOGY.

The Silurian Species of Glauconome, and a suggested Classification of the Palæozoic Polyzoa.—This was a paper recently read before the Geological Society, by Messrs. G. W. Shrubsole, F.G.S., and G. R. Vine. The authors discussed the history of our knowledge of the genus Glauconome, and especially of the Silurian species. They then characterised the genus, to which they refer only the Bala species formerly regarded as identical with *G. disticha*, Goldf., but which they describe as *G. Sedgwickii*, Shrubs. *Glauconome disticha*, Goldf., from the Wenlock of Dudley, is taken as the type of a new genus Arcanopora. The authors then remarked upon the characters on which the classification of the Polyzoa is founded, drawn from the study of the recent forms, and stated that throughout the Cainozoic and Mesozoic series no Polyzoa are known which cannot be referred to the recognised groups. Many Palæozoic forms are in a different case. The orifices seen on the surface are not, in many instances, the mouths of the cells, but those of what the authors call vestibules beneath which the true cell-mouth is concealed. For these types they propose to found a new suborder under the name of Cryptostomata, and characterised by having the zoœcia subtubular, or, in section, slightly angular, and the orifice surrounded by a vestibule or otherwise concealed. The families referred to this group are the Ceramoporidæ, Ptilodictyidæ, and Arcanoporidæ.

On the Cause of the Depression and Re-elevation of the Land during the Glacial Period.—Mr. T. F. Jamieson, F.G.S., has read a paper on the subject before the above Society. The author commenced by noticing the theory advanced by Adhémar and Croll, according to which the submergence was due to the effect of a polar ice-cap causing a displacement of the earth's centre of gravity, and thereby drawing the ocean towards the ice-covered pole; he proceeded to show that this theory is opposed to the geological evidence, according to which the amount of submergence has been unequal in adjacent areas and along the same parallels of latitude, showing that the movement has been in the land and not in the sea. The facts of submergence also prove that no such cap of ice could have existed at the time in the northern regions. Sundry other objections were also pointed out. The author then went on to state his own hypothesis, which is to the effect that the depression of the land was caused by the weight of ice laid upon it, and the re-elevation by the disappearance of the ice. The amount of depression would depend partly on the weight of ice and partly on the elasticity or yielding nature of the ground beneath it. He then proceeded to consider what was the weight of ice that probably existed, and referred to the elastic and flexible nature of the earth's crust, as evinced by earthquakes, &c. He further considered the relation of time to pressure, and touched upon the probable rate of subsidence, which he supposes to have been very slow and gradual. The recovery of level, he thinks, would also be very gradual, and probably, in most cases, not complete. He next proceeded to show how his hypothesis is borne out by an appeal to geological evidence in various countries, taking England, Ireland, North America, and Greenland as examples. He further pointed out its application to the facts connected with the loess beds, Fjord latitudes, and lake-basins, and concluded with some observations on the remarkable connection between glaciation and submergence in all countries.

"Half-Holiday Handbooks."—This is a series of ninepenny *brochures* published by Mr. T. Fisher Unwin (late Marshal Japp & Co.), which purport to give an account of the Geology, Botany, and Natural History of various districts favourably situated for holiday excursions. Being familiar with some of the districts mentioned, we have personally tested the accuracy of these Handbooks, and have been agreeably surprised by their fulness, clearness, and general accuracy. The first is entitled "Geological Rambles around London." "Greenwich and Blackheath;" "Round Tunbridge Wells;" "Round Reigate;" "Kingston-on-Thames;" "Dorking and Neighbourhood;" "Round Richmond;" "Croydon to the North Downs," &c., are others. All are illustrated by maps, fossils, plants, insects, &c. They are most valuable auxiliaries to a holiday tour, and many a young naturalist will be grateful to their authors and publisher for their publication.

NOTES AND QUERIES.

The Cuckoo's Eggs.—In the lists that I have seen of nests in which the cuckoo lays her egg (or eggs, as the case may be), I have never noticed that of the reed warbler (*Salicaria arundinacea*): a day or two ago, however (May 19th), on an island in the river, which had been selected for breeding by several pairs of reed warblers, I found one nest with three eggs "sui generis," and one cuckoo's egg. The cuckoo had been noticed about the island on the preceding day.—*G. T. B., Oxford.*

Unexpected Guests.—Some time ago my son brought in some cocoons, which he said he had taken from a thorn hedge. I thought they must be the compact cases of the small eggar moth, and accordingly waited for the emergence of the moths with some pleasure. Judge of my surprise when my cocoons produced, not moths, but bees! These insects have clubbed antennæ, and beautiful bordered wings, which give the appearance of having been varnished. I enclose one of the empty cases, in the hope that you will be able to help me to the name of my unexpected guests.—*W. M. C. C.*

BIRDS TAPPING AT THE WINDOW.—I have been in the habit of feeding the sparrows from my bedroom window early in the morning; should I be rather late they tap at the window and call, and continue to do so until I give them the usual bread crumbs. When the young ones can fly a little the hen bird brings one and puts it in a warm corner of the window sill, and then taps vigorously at the glass, and stretches her neck to peep into the room. —*H. M. Hardwicke.*

LARGE CARP.—A week or two ago (beginning of May) a large carp was found dead in a reservoir in this parish: a friend who passed by when it was taken out measured it carefully with these results: length $27\frac{1}{2}$ in., depth $7\frac{1}{8}$ in., scales 1 in. × $1\frac{1}{3}$ in.—Unfortunately he had no means of weighing it. I should be glad to hear of instances of larger carp.—*K. D., Cofton Hackett.*

COCCUS VITIS-VINIFERÆ.—Can any of your numerous readers inform me whether the *Coccus vitis-viniferæ* (Linnæus) so accurately described in White's "Selborne" (letter 53 to Mr. Barrington), is of common occurrence in England now? White mentions it as being uncommon. I observed it a year or two ago on a vine at Blackheath, and some time afterwards came across White's description, from which I recognised this insect at once.—*C. F. Worters.*

BEES.—A swarm of bees came out of a large flat-topped skip, at 2 o'clock in the afternoon of Thursday, the 24th of June, 1881, and settled in the topmost boughs of an elm-tree close by: the tree was rather tall, so the owner would not risk his life (as it was rather an awkward place), nor allow his man to do so, trying to get the swarm; it had rained just previously to their coming out, so that the leaves were still wet. The swarm hung in the top of the tree, as described, till about 4 o'clock on Saturday, 26th, when it left, and was followed and watched across a large lawn, and then a wheat field, where it was lost sight of over some trees.—*T. E. L., Creeting, Suffolk.*

RARE BIRDS.—I earnestly wish that the readers of SCIENCE-GOSSIP would do all in their power to encourage the presence of rare birds when these vouchsafe us a visit. What an opportunity was thrown away when, as related by one of your correspondents, a Bohemian waxwing, one of a pair, was killed last January by a boy, with a catapult, a weapon whose use ought to be prohibited altogether. If we could teach the young that the true naturalist is not a mere destructive, there might be a chance by-and-by of some rare birds settling among us.—*H. B.*

WAGTAILS.—Regarding the behaviour of the wagtail, mentioned by Mr. Snell, the explanation given by G. H. K. of birds tapping at the window (SCIENCE-GOSSIP, p. 142), is in my opinion an explanation of the whole affair. I often observed wagtails disporting themselves on the roof of my dwelling-house, especially about the windows, on the panes of which they are often tapping, attracted by the numerous flies and gnats to be seen lurking about the window-sashes. The reason the wagtail declined the proffered hospitality arose from the fact that the food offered (seeds) is not a tempting bait for insectivorous birds.—*J. M. C.*

BIRDS AND THEIR EGGS.—There appears to be a general belief that if only one or two eggs are taken from a nest of three or four, the hen bird will lay more; but that if the egg is taken from a nest where only one has yet been laid, the birds will desert. Now this in itself seems utterly absurd, for surely if a bird can tell when one egg has been taken, it can also tell when two eggs have been taken from a nest of four. Now I believe that most small birds will desert if an egg be taken or the nest in any way disturbed, and I should much like to have the opinion of your readers on the subject. For I think that the decrease of our small birds is to some extent due to egg collectors, who unintentionally do this harm. Another reason for the decrease is, I think, the wholesale destruction of every sort of egg that is carried on in the country by small boys. In the nesting time nearly every boy one meets in the country has his cap full of different sorts of eggs which he offers for sale. The "Wild Birds Preservation Act" has undoubtedly done a vast amount of good, but it would be a still better thing if the taking of eggs as well as the taking of young birds was unlawful.—*X. Y. Z.*

SWALLOWS' NESTS.—In your issue of the 3rd inst., I observed some interesting notes on the above, hence my inclination to submit to you the following: There is, and has been for years, a pair of swallows nesting under the roof of one of the outhouses surrounding a school in the district from where I am writing. The nest is not more than eight feet from the ground, and what is more, it is in the playground. The nest is known to all the children, who watch the old birds go in and out undauntedly on their parental missions. A few years ago a swallow built its nest and reared its young in one of the corners of an upstairs window; the house was only one story high, and the window was down all day and a sewing machine working; but the birds took no more notice than if all was quiet.—*Phiz, Manchester.*

THE POSITION OF THE HERON WHEN INCUBATING.—A well-known and scientific naturalist who remarked my note some time since in SCIENCE-GOSSIP, wrote to say he believed the statement of herons sitting on their nests with a leg at each side, instead of under them, to be perfectly correct, adding that as there was a heronry in his vicinity he would visit it and make sure of the fact. I received the following note from him last week: "I went to —— on purpose to see the birds on their nests, and the owner of the heronry and I can fully confirm your statement, indeed I had no doubt about it before." He adds, "have you ever noticed the way in which herons drop on their nests, feet foremost, or perhaps I should say hindmost, from a considerable height, the wings supporting them like a parachute?" Country folk have often noticed and mentioned the curious position assumed by the heron when incubating, but probably book naturalists will think the testimony of two eye-witnesses (a scientific gentleman and a "gunner") worth recording as to the fact.—*Frances J. Battersby, Cromlyn, Rathoven, Westmeath.*

WATER-SNAILS.—The admirable article in your last issue on "Water-Snails; a Study of Pond Life," by the author of "Plant Life," contains what is to me a strange and somewhat dogmatic assertion. It is this, "There is no such phenomenon as spontaneous generation. No living cell can be produced save by the division of an already existing cell." From the context I, of course, gather that the writer intends these propositions to be universal negatives, and not applicable alone to the particular case of the snail. At present I will defer remarks, but simply content myself with seeking information by asking, "How does the writer know there is no such phenomenon as spontaneous generation?" Does he argue that because the snail is not produced by spontaneous generation, there is no such process at all; or does he hold that because spontaneous generation has not yet been detected, no such process is possible, or if possible that it never will be discovered? If he depends on authorities for his assertion, I shall be glad to learn who they are, for, so far as I can ascertain, the bitterest opponents of archebiosis content themselves with denying that it has been, not that it ever will be discovered. To frame universal propositions on imperfect knowledge is an acknowledged logical fallacy, and even granting that all the forms of life with which we are acquainted are produced in the manner described (which, however, I do not in reality by any means admit) to assume that all the forms of life with which we are unacquainted also owe their existence to previously existing life is a very unscientific position to take up. With regard to the second proposition, pp. 8, 9, and 10 of Sachs's "Text Book of Botany" are occupied with a description of "(1.) The Renewal or Rejuvenescence of a Cell; *i.e.* the formation of one new cell from the whole of the protoplasm of a cell already in existence; (2.) The Conjugation or Coalescence of two (or more) protoplasmic bodies in the formation of a cell." Neither of these processes can be called the division of an already existing cell. Bastian, in his "Beginnings of Life," describes the development of colourless blood corpuscles, *i.e.* protoplasmic cells, in serum, taken from the human being, containing no corpuscles from which the new ones could arise, and kept in a vessel at the temperature of the body from which it was derived. This, I should say, would be a case of protoplasm arising in an organic, not an organised, fluid, and altogether independently of cell-division or cell influence at all. I have not Bastian's work by me at present, but if required I can quote *ad literatim* on a future occasion.—*J. Hamson, Bedford.*

TROPIDONOTUS LIBERIS.—H. C. Brooke inquires about the habits and range of *Tropidonotus liberis.* It is not an uncommon snake in the States south of and adjoining the Great Lakes. Penna and Ohio seem to be its principal habitats. It is aquatic in its habits, frequenting stony mountain streams.—*C. H. T., Acad. Nat. Sciences, Phila. Pa.*

WHITE FLOWERS.—I have found in Cornwall white varieties of the following plants: *Polygala vulgaris*, somewhat frequently; *Stachys Betonica*, occasionally; *Centaurea nigra*, once or twice; *Thymus serpyllum*, once only.—*J. Snell.*

SNAILS NEAR LONDON.—Under the heading "Notes and Queries," in the current number of SCIENCE-GOSSIP, your correspondent, A. S., asks for information as to the best hunting-ground for land snails near London. On Whit Monday I visited Warlingham (Caterham Branch, S. E. R.) and proceeded from the station towards the "Leather Bottle Inn." If your correspondent cares to take the road I followed, viz. from the inn in a direct line for Caterham, and about ten minutes' walk from the aforesaid inn, he will pass down a rather steep hill, having on his left-hand a beech wood, and on his right a high bank, covered chiefly with nettles, long grass, and blackberry bushes. On this bank I secured *Cyclostoma elegans*, *Helix cantiana*, *Helix pomatia* (very fine specimens), *H. rufescens* and *Helix aspersa.* In the beech wood, on the trunks of the beeches, I took *Helix nemoralis*, *hortensis* and *hybrida*, fine specimens. I have been informed, by a gentleman who had previously taken several specimens, that *H. pomatia* (white species), as mentioned by Jeffreys, has been secured at Caterham. This locality is really a good hunting-ground, and would probably repay a visit by your correspondent.

ORIGIN OF JET.—It is yet undecided as to what is the nature and origin of jet. The greater part of chemists seem to think that it is a kind of bituminous wood or lignite. Others say that it is a kind of indurated carbon. I myself think that it is a form of lignite. It may be found in the Upper Lias of the Yorkshire strata and in Spain.—*J. Williams.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

T. CHRISTIAN.—The plant enclosed was *Thlaspi arvense.* We failed to find any "minute reddish objects" in your box.

S. G. R.—Your plant is the common Twayblade orchis (*Listera ovata*).

W. W. WATTS.—Your paper is to hand, and will appear shortly.

H. P. MALET.—We have not space for you to continue the discussion. We were bound in courtesy to allow Mr. Halse to reply to you, and there the matter ended.

J. SCOTT.—No. 1, Water-dropwort (*Œnanthe crocata*). No. 2, Cudweed (*Gnaphalium uliginosum*, L.). No. 3, Skull-cap (*Scutellaria galericulata*, L.). No. 4, Common red dead-nettle (*Lamium purpureum*). No. 5, *Lastrea* or *Nephrodium uliginosum*, a rare fern. No. 6, Lady-fern.

VIOLA (Emsworth).—We should have no hesitation in naming the species *V. sepincola*, Jord.

E. W. (Bristol).—It is a form of *Sphagnum cymbifolium.*

F. A. D. (Winchester).—*Veronica polita*, Fr. We should prefer the more recent edition of "Student's Flora" to the work you mention.

J. H. M. (Piccadilly).—From leaves only it is impossible to give the name correctly, though it certainly is a cruciferous plant; so far you are quite correct.

J. M. H. (Staindrop).—We believe it to be *Viola Reichenbachiana*, Bor. Note the spur, it is very unlike *V. hirta.*

R. C. (Perth).—There are two species of lichen. The most prominent, slate-coloured, is *Parmelia saxatilis*; it is not a fungus, as you suspect.

A. W. (York).—The plant is *Galeopsis tetrahit*, L.

F. A. S. (Stockwell).—Thanks for kind wishes. The exotic plant is new to us; it will be named in our next number.

R. L. M.—Halodactylus is the name of a genus of Polyzoa, found in the German Ocean adhering to seaweeds. *Clavaria ophioglossoides* is a fungus found in Carolina, U.S. Its name is now *Geoglossum glabrum.*

V. G.—The objects floating to the surface of the lake were the fruits of *Trapa natans*, known as "Water chestnuts" and "Jesuit's nuts." The plant is a member of the natural order Haloragaceæ.

J. E. PRIESTLEY.—Your box was smashed when it reached us, and the caterpillars had escaped.

B. TOMLIN.—Write to Mr. R. Damon, Weymouth, for label lists for shells. The "Emperor of Morocco" butterfly (*Apatura iris*) is more frequently called "Purple Emperor." The inner surfaces of the wings are of a rich shining purple colour; the outside have some rusty yellow about them, so that Lord Lytton was hardly correct where he speaks of it as a "yellow" insect in "Kenelm Chillingley."

B. SKEATS.—Your plant is the money wort (*Lysimachia nummularia*). Mustard grows on wet flannel because the seed-lobes secrete chlorophyll and act as true leaves.

C. F. WORTERS.—Thanks for the specimen of malformed daisy. It is an illustration of the peculiar malformation known as Synanthy.

R. WOOD.—The insects are *Lepisma saccharina*, belonging to the Thysanuradæ.

MR. C. E. WADDINGTON has sent us a slide purporting to contain mineralised diatoms, which we searched in vain to find. Mr. Waddington forwarded it to us as a specimen of unfair exchange by one who frequently uses our columns. We can only hope it is a mistake, for we feel ourselves bound to see that fair play is used, and would strongly counsel generosity in exchanges.

A. C.—We only observed one species of Acarus in the beetles sent us, the common beetle-mite (*Gamasus Coleoptratorum*).

F. H. S.—Your bottle contained the larva of a dragon-fly, and the eggs of some species of mollusca, probably Lymnea.

W. D. CARR.—The *Cucullæa* is strange to us. The *Arca* is not complete, but appears to be *rugosa*; the small shells are *Delphinula* probably *Pratti*.

W. THOMSON.—The abortion of the ovary of the bird cherry sent us (*Prunus padus*), resembles a well-known monstrosity of the plum, called "bladder" plum, which contains no stones, and is elongated like a bladder. This is figured in Masters's "Vegetable Teratology," page 464.

C. H. G.—Accept our best thanks for specimen of red geranium, showing leaves replacing flowers in the umbel. It was a very interesting object.

NATURALIST.—There is no "Southern Naturalist;" Dixon's "Geology of Sussex" (new and recent edition) will give you the geology, and the publications of the Brighton and Sussex Natural History Society, and of the Eastbourne Natural History Society, are rich in papers on the fauna and flora.

EXCHANGES.

FUNGI. Wanted, correspondents with some knowledge of fungi; also books on this subject, especially Berkeley's "British Fungology" (Reeve), and the parts which have appeared of Cooke's "Illustrations of British Fungi." Will give full value in exchange. Send particulars of requirements to J. R., Strood Green, Billingshurst.

WANTED, a powerful magneto-electric machine, with double magnet preferred; exchange.—John R. Marten, chiropodist, Red Hill.

SEA-WEEDS. Offered, specimens of foreign genera and species. Wanted, British. Lists on application.—R. Wood, Westward, Wigton.

MOSSES and lichens in exchange for mosses, flowering plants, or fossils. Lists exchanged.—E. H. Starling, 146 Alexandra Road, London, N.W.

CHAMELEONS.—Wanted, different species, in spirits or skin. Exchange, fossils, shells, &c.—George E. Mason, 6 Park Lane, Piccadilly, London.

SEA-WEEDS (*Ulva latissima*) and sea anemones, especially *Actinoloba dianthus*, wanted in exchange for stellate hairs (mounted) and other micro objects.—R. A. R. Bennett, Walton Manor Lodge, Oxford.

WANTED, gatherings of desmids; especially Quastrum, Cosmarium, Staurastrum, Desmidium, and Didymoprium. Valuable botanical slides, reproducing figures in Sachs's "Botany" in exchange.—C. V. Smith, Carmarthen.

DUPLICATE, Artemis, caught this year. Wanted, Edusa, Rhamni, Hayle, Cardamines, Corydon, Carpini, Villica, Dominula, and others.—R. Garfit, Vine House, West Street, Alford, Lincolnshire.

WANTED (side-blown only), eggs of shrikes, pied flycatcher, stonechat, wheatear, goldcrest, longtailed tit, Ray's wagtail, rock pipit, hawfinch, twite, nuthatch, and teal, in exchange for rare dried plants or eggs.—G. F. W. Lees, 93 Tanners' Lane, Warrington.

FOR exchange, birds' skins and eggs, also birds in flesh.—J. T. T. Reed, Ryhope, Durham Co.

WANTED, coins, medals, tokens, and naval and military war medals in exchange for fossils, minerals, and a variety of natural objects.—F. Stanley, Margate.

DIATOMS (mounted and named) wanted in exchange for shells and fossils, &c.—P. Mason, 6 Park Lane, Piccadilly, London.

SIDE-BLOWN specimens of white-throated sparrow, great northern shrike, golden-winged woodpecker, killdeer, red-winged starling, reed-warbler coot, and many others. Full data.—W. Wells Bladen, Stone, Staffordshire.

A FEW local birds' eggs to exchange for other side-blown.—S. E. Duvall, Butter Market, Ipswich.

OFFERS in exchange requested for stuffed heron, partridge, pheasant, and turtledove; also the following skins, great northern diver, great black-backed gull, and two silver pheasants.—Alfred Baker, Tewkesbury.

LARGE cabinet, suitable for birds' eggs, shells, fossils, &c., height 20 in., depth 11 in., width 18 in. Will exchange for birds' eggs.—S. Wager, 72 Middle Street, Stroud, Gloucester.

I AM anxious to correspond with collectors, amateur or professional, of marine organisms living, especially Hydrozoa and Polyzoa.—E. Wade Wilton, Northfield Villas, Leeds.

A COLLECTION of about 1500 foreign and British postage-stamps in Oppens' "Stamp Album," to be exchanged. Wanted, cabinet for butterflies and moths or microscopic slides, &c.—F. A. A. Skuse, 143 Stepney Green, London, E.

ENTOMOLOGY: set of specimens of large skipper butterfly and drinker moth in exchange for set of specimens of other sorts.—W. Foddy, 13 King Street, Stony Stratford.

WILL exchange five volumes of "Design and Work" for works treating on the microscope or microscopic apparatus.—L. Francis, 20 Frogmore Street, Abergavenny.

FOR exchange, forty-one numbers, unbound, in good condition, with plates, highly finished in colours, of "The Genera of Recent and Fossil Shells," by G. B. Sowerby. Wanted, section cutter, books on natural history, &c.—John Boggust, jun., Alton, Hants.

Testacella Maugei, *Conovulus myosotis*, &c., offered for *Pupa ringens*, *Vertigo alpestris*, *Limnea involuta*, &c.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

WANTED, specimens, alive or dead, of natterjack toad and edible frog. Also fresh plants of *Conclinum autumnale* and *Polygonum bistorta*. For exchange.—S. B. Axford, 15 Commercial Road, Bournemouth.

SLIDE of *Gomphonema geminatum* in exchange for any interesting object.—A. W. Griffin, Saville Row, Bath.

Trigonia pulchella (Agaz.) in exchange for other Trigonia.—W. D. Carr, 80 Carholme Road, Lincoln.

WANTED, polariscope, camera lucida and Lieberkühn. Can offer in exchange small entomological cabinet of six drawers, drying-house for setting lepidoptera, the "Entomologist" and SCIENCE-GOSSIP of 1878 to date, also a good guitar of Dutch make.—J. P. Hiller, 38 Hornsey Street, Holloway, N.

$\frac{1}{8}$ Object-glass, Smith and Beck, and $\frac{2}{3}$ Baker, for five pounds, less than half cost. Warranted perfect. Forwarded on receipt of cheque.—Rev. R. Browne, 120 Inverness Terrace, Bayswater, London, W.

Æcidium Urticæ, *Xenodochus carbonarius*. Mounted slides of above. Send lists, botanical preferred.—A. Norris, Urmston, Manchester.

BOOKS, ETC., RECEIVED.

"A Manual of the Infusoria." By W. Saville Kent, F.L.S. Part 6 (complete). London: D. Bogue.

"Animal Intelligence." By G. R. Romanes, LL.D. London: C. Kegan Paul & Co.

"Faith the Life-root of Science." By H. Griffith. London: Elliot Stock.

"Studies in Nidderdale." By Joseph Lucas. London: Elliot Stock.

"Catechism of Modern Chemistry." By E. W. Volckxsom. London: Kegan Paul.

"Smithsonian Report, 1880." Washington: Government Printing Office.

"Micrographic Dictionary." 4th edition. Parts 8 to 13. London: Van Voorst.

"Studies in Microscopical Science." By A. C. Cole.

"Northern Microscopist."

"Midland Naturalist."

"Scottish Naturalist."

"The Field Naturalist."

"Proceedings of the Liverpool Naturalists' Field Club."

"Journal of the Postal Microscopical Society." No. 2.

"Natural History Notes." Vol. ii., No. 7.

"Land and Water."

"Aunt Judy's Magazine."

"Ben Brierley's Journal."

"American Naturalist."

"Boston Journal of Chemistry."

"Bulletin of the Torrey Botanical Club, New York."

"Cosmos: les Mondes."

"Ciel et Terre."

"Revue Botanique."

"Feuille des Jeunes Naturalistes."

"La Science pour Tous."

"Le Monde de la Science."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 8TH ULT. FROM:—C. F. G.—T. W. O.—R. A. R. B.—J. N. S.—A. W.—A. L.—G. E. M.—C. V. S.—C. E. W.—T. S. K.—P. Q. K.—R. L. M. J. F. G.—W. T. L.—E. T. S.—E. H. S.—J. R. M.—J. R.—J. B.—W. B. G.—E. L.—A. K.—L. S. G.—J. J. R.—A. W. G.—L. F. W. F.—C. H. G.—F. A. A. S.—C. F. G.—F. H. A.—E. W. W.—S. W.—A. B.—H. M.—J. R. N.—D. B.—E. C. R. L.—S. B. A.—J. W. C.—J. F.—P. M.—Theta—F. S.—W. W. B.—J. T. T. R.—G. F. W. L.—F. K.—P. Q. K.—T. M.—W. B. G.—T. C.—R. G.—J. D. H.—J. G. R.—J. T. R.—G. B.—R. M. C.—L. F. W.—G. D.—B. T.—F. T. W.—W. L.—S. G. R.—E. S.—J. S.—E. M.—E. W.—H. L.—J. E. P.—E. B. K. W.—A. N. P.—E. L.—A. H. S.—H. E. W.—A. C.—&c.

ON BRITISH FRESHWATER MITES.

By C. F. GEORGE.

No. I.

IT has often been a matter of great surprise to me, that in these days of microscopic investigation, with such a large army of lovers of pond life, and the existence of an establishment for supplying living specimens for the microscope, besides the numerous exchanges constantly going on (as testified every month by SCIENCE-GOSSIP), that nobody should have taken up as a subject the "British Freshwater Mites." Of course they must have been seen, examined, and admired, probably too, been frequently made a subject of study, but, so far as I know, nobody in this country has hitherto given us the result of his investigations; of course I do not mean to say, that there have not been isolated papers, in journals and periodicals, but even these have been very few, and so scattered, that it would be a great labour to search for and collate them. The "Micrographic Dictionary" gives us some definitions and figures, but these are chiefly, if not altogether, taken from Walckenaer's "Aptères." A. Murray also, in that very cheap manual of his, "Economic Entomology"—"Aptera," published as one of the South Kensington Museum Handbooks, gives us some little information on the subject, but it is all borrowed, some of it erroneous, and therefore, misleading. On the continent, however, some magnificent and most laborious works have been published, but, so far as I know, none very recently. Just a hundred years ago, 1781, O. F. Müller published in Latin a very valuable treatise, entitled "Hydrachnæ quas in Aquis Daniæ palustribus," &c., accompanied by most excellent plates. The most important work I have yet seen is in German, somewhat expensive and difficult to meet with; I have no copy of my own, but have had the opportunity and great pleasure of seeing the book belonging to the Quekett Club (being a member of that society), I mean C. L. Koch's "Deutschland's Crustaceen," &c., a work of great labour and the highest merit, supplemented also in 1842 by his "Uebersicht." Kramer, too, has published papers in Germany (some of which I have seen), and probably other foreign authors have done the same—there is also Walckenaer's "Aptères" in French—but all these works, important as they are, are in some foreign language, and practically non-existing to many of the readers of SCIENCE-GOSSIP, especially to such as, like myself, are busily occupied with some profession, far removed from good libraries, from scientific fellowship or societies, and who only take up microscopic natural history as a recreation from other, to them, more important work.

With the editor's permission, therefore, I am about to give some of the results of my own observations on "British Freshwater Mites," hoping they will excite others to take up the subject, and that, eventually, somebody may be found possessing the necessary time, artistic skill, and powers of investigation to give us a history of British Hydrachnidæ, accompanied by portraits and drawings of microscopic details, far in advance of anything which has yet appeared, in this, or any other language. In order to make a good foundation, and to avoid or explain the inherent difficulties of our subject, it will be necessary to lay down certain definitions, and, though there is no rule without an exception, we must make these definitions as rigid as possible. Water mites then are defined as wingless insects, living in or under water, having the head, chest and abdomen united, and possessed of eight legs, a pair of jointed palpi, and two or four eyes. Müller also adds, six eyes; but, so far as I know, no other observer has met with water mites with six eyes. As I said just now, there is no rule without an exception, and the definition I have just given only applies to water mites in their nymph and perfect states, for, as will appear hereafter, the larval mite has but six legs. These creatures are again divided into two great sections—the swimming mites (*i.e.* mites having special bristles attached to some of their legs for the purpose of swimming) and the crawling mud or marsh mites ; these latter cannot swim, but walk about under the water on the mud and weeds, they have not the special bristles attached to their legs, although these are by no means destitute of hair. The water mites are again very conveniently divided into those possessing two eyes, Hygrobatides, and those having four eyes, Hydrachnides. The former were supposed to be river mites, or mites living in moving water ; and the latter, pond mites, or those to be found in stagnant water ; this is however, not correct, for all the kinds may be found in stagnant ponds, as well as in slowly moving water, such as fish-ponds and rivers; so these divisions, though artificial, are so clear that the merest tyro cannot well make a mistake, and it is a great point to be able to clear away a whole division by the presence or absence of a single character. We now come to the separate families, and here we shall meet with many difficulties made more complex by the fact that different authorities use the same names for very different families. I shall, however, follow Koch as nearly as I can, believing that all his remarks and figures are the result of actual observation, and not copies from other authors ; and, for teaching, I prefer a poor figure from nature to a more elaborate one concocted from copies, because these latter, when the object itself has not been studied, are as likely to make prominent any slight error, or accidental defect, as the most important parts of the figure. Before we proceed further, perhaps a table showing how far we have got, may be of service :

Water mites.	1. Swimming mites	Hygrobatides, with apparently but two distinct eyes.
		Hydrachnides, with four eyes.
	2. Mud or marsh mites, all with four eyes.	

(*To be continued.*)

NOTES ON SOME COMMON SEA SLUGS.

By Dr. P. Quin Keegan.

[*Continued from page* 182.]

DORIS JOHNSTONI is another species very like the preceding, but it is not so large, and it is not common anywhere. It is of a lightish tint of yellow, speckled with a few small brown spots ; the pimples that stud the cloak are more minute and of equal size ; the branchial plumes are fifteen in number, tripinnate like the last, and when unfolded wear the likeness of a kingly crown in miniature. This species measures about $1\frac{3}{4}$ inch long at most. Its tongue bristles with an armature of stoutish hook-like teeth, which are marshalled in twenty-four double ranks as before, each rank comprising about twenty-five teeth, the total number being therefore about 1200 (five on the extreme left and right of each row are slenderer than the other twenty, and are set at a different angle).

If during the early spring-time we take a walk among the loose tide-forsaken boulders which strew the beach near low-water mark, we shall probably observe high up upon a wave-worn stone a cluster of soft, flattish, flabby, warty bodies clinging together as if for mutual support and protection, or in the spirit of good-fellowship. These are specimens of *Doris bilamellata*, a species that may be considered as the commonest and most numerous of all the British sea-slugs.

Its cloak is of a yellowish-grey colour, but it is flatter, rougher, and more dappled and blotched with brown than that of either of the foregoing species. The branchial plumes when expanded from their common enclosure are seen arranged in a horse-shoe form to the number of from twelve to twenty-nine ; they are very fresh-looking, and so developed that ample aeration is provided for the ovarian and hepatic blood of this animal, and probably such is required on account of its fecundity and the large size of its egg-frills. The cloak is charged with spicula which are stoutish, blunt at the points, and bent at the centre, where there is usually a tiny spur or branchlet. There is a very remarkable difference in the jaw and palate of this species, as compared with those of the foregoing. There is a spiny collar here fitted for grasping, and the tongue, instead of being square, is narrow and strap-shaped, and armed with twenty-eight rows of only two teeth on each side (or 112 in all), the inner ones of which are very large and of a triangular pattern, slightly curved above, while the outer ones are rudimentary and blunt ; and in the centre of the organ there is seen an ear-shaped membranous fold.

If during the autumn we turn over the tresses of seaweed that flow so luxuriantly over the crests of the huge stones near low-water mark, we shall possibly discover a small convex, egg-shaped organism of a light waxy-blue colour, of a transparent substance, and studded with rather long webs of flabby flesh, while from one extremity there issues a slender fringe of minute filaments. This is *Doris pilosa*, a species that seems to prefer the close covert of sheltering seaweed to the flaring exposure of the bare rock. The gills, which are seven to nine in number united at the base, are contractile only, not retractile into any cavity, hence, when we place the animals in sea-water, these organs forthwith unfold and assume their shape which is starlike, and moreover they have white midribs and a double row of globular hollow bodies in each stem. Under a hand-lens the skin is seen extensively inlaid with large spicula, which are of the usual rough and clumsy pattern characteristic of the tribe. As compared with the sponges, these nudibranchs are exceedingly clumsy and unmechanical artificers of spicula. *D. pilosa* seems to be rather more active on its foot than its congeners (its pedal ganglia are quite distinct), it crawls with greater facility and velocity. Its jaws are curiously constructed. They are furnished with a collar divided into two parts, broad below and tapering to a point above, and thickly studded with two-cleft spines, with two small horny triangular plates below. The tongue somewhat resembles that of some of the Eolidæ; it has twenty-seven rows of eight teeth each (four on each side), the three outer ones being mere rudiments, while the inner ones are very large and broad below with a lateral arch, the apex being much extended and curved, with a row of minute toothlets like a tiny balustrade flanking the side. This species ranges in habitat from about mid-tide level to the coralline zone, or to about fifty fathoms depth.

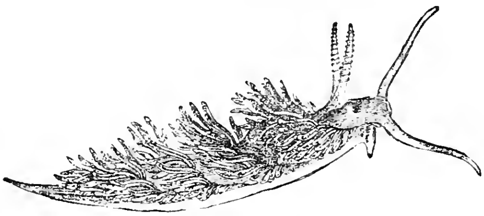


Fig. 134.—Sea Slug *(Eolis coronata).*

There are various other species of British Doridæ, a few of which, although comparatively rare and not specially partial to the life ashore, are still commoner than their immediate congeners, and on this account we shall merely indicate briefly their more salient specific characters. And it may be premised that in these forms we observe two principal features which distinguish them from the genera already delineated, viz., (1) the cloak gradually becomes smaller and more "cutty," and (2) the gills are less developed, and their function becomes shared or more or less usurped by a series of appendages which now begin to sprout forth from the sides of the body. Thus in *Goniodoris nodosa*, the cloak, occupying only the foremost two-thirds of the back, exposes the head and foot, it has a curved edge, and a central elevation with a row of minute tubercles or wart-like appendages on each side; this species has thirteen branchial plumes smaller than in Doris, its length is about one inch, and it is of a white colour tinged with yellow and pink, and dappled with white spots. *Triopa claviger* has been described as like a little lump of whitish jelly dappled with orange-yellow, not bigger than half a split pea, clinging close to the under side of a stone. It is of an oblong shape with about seven well-developed appendages on each side of the smallish cloak, the branchial being reduced to three in number; tentacles are club-shaped organs in front of the head and retractile within sheaths, the tongue has about twelve curved denticles on each side, the outer two being longer than the rest, and the skin is charged with cross-shaped and three-edged spicula. *Polycera quadrilineata* is a third species; it is widely distributed, and therefore very variable, its gills, which are seven to nine in number, are conspicuously assisted in their function by a large appendage on each side, the cloak is smaller than in either of the two preceding species; the body is nearly one inch long, lanceolate, convex, smooth, and of a white colour dappled with golden yellow, and there are four to six awl-shaped processes on the head which are tipped with yellow; there are few spicula in the body, and the creature is very active, with a predilection for swimming back downwards at the top of the water; the tongue has fifteen rows of twelve teeth in each tier.

Occasionally, when fumbling about amongst the small loose stones scattered near the water's edge, we turn up one, whereon there appears beneath a curious, irregular, transparent, yet coloured, filamentous, flabby body. It is not much larger than a pea, and seems curled up, or so packed and bundled "all of a heap," as to elude observation; for surely a superficial glance would fail to discover anything peculiar. However, on carefully removing this snack of painted jelly, and placing it in a vase of sea-water, one of the most beautiful little animals in creation immediately "pulls itself together," or rather unfolds to complete view. There is a waving movement of the body, and instantly dense clusters and tufts of dark-red striped filaments (papillæ) quiver and disentangle themselves, and unfold like the petals of a fairy flower in the pantomime. Snatched from the dull dark rock, grovelling amid mud and slime, its colours and tints seem invested with a fairy loveliness. Tiny as the organism is, its painting is exceedingly beautiful, and its movements very graceful, for it is boneless, so that no clumsy joint interferes to check the free suppleness of action. Seductively beautiful as it is, however, let every minor creature beware of its proximity; for there lurks deadly danger in its lines, poison in its touch, utter ruin in its very approach. The tips of the exquisite filaments that wave and quiver so gracefully over its back, constitute an armoury of poisoned darts, a very battery of mitrailleuses ready charged to hurl thousands of death-winged missiles upon the foe. This beauteous animal is a species of *Eolis*, the type of the family Eolidæ, a group of Nudibranchs which is distinguished from the Doridæ by the presence of the following important characters:—There are no special gills, nor any characters essential to a true gill (aeration being performed by the whole surface of the body); the stomach and liver extend and branch out into a series of lengthened warts (papillæ), which are situated on the sides of the back; there are no special cloak and no spicula in the skin; the systemic blood-circulation is uncomplicated; the tongue is usually narrow, with a single series of large teeth; and there is a stinging or poisoning apparatus.

(To be continued.)

ON THE ALTERNATION OF GENERATIONS (HETERŒCISM) AMONGST THE UREDINES.

SOME of the readers of SCIENCE-GOSSIP may remember that last year a number of experiments were conducted by the writer, upon the alternation of generation said to exist between the Æcidium on barberry, and the wheat mildew (*Puccinia graminis*). The general result of these experiments was this, that of the total number of wheat plants upon which the spores of the barberry fungus were sown, 76 per cent. became affected with the uredo, which is the first state of the wheat mildew. But upon the other hand no less than 70 per cent. of precisely similar wheat plants, grown under the same conditions, but not intentionally infected, became in the course of the same time likewise affected with the uredo. Obviously the slight difference of six per cent. could not be considered conclusive evidence. In the spring of this year a further series of experiments were commenced, in which the wheat mildew of last autumn was sown upon young barberry plants, with the result of producing in every instance *Æcidium berberidis*. The æcidium spores were likewise sown upon young wheat plants, that had never been exposed to accidental infection from the atmosphere, with the result of producing the uredo; while control plants grown under the same conditions remained free from it.

The matter, however, does not rest here. There are many uredines said to be heterœcismal in their habit; if we accept the case of *Æcidium berberidis*, and *Puccinia graminis*, we can hardly refuse to believe in the heterœcism of the other species. This is accepted generally on the Continent without question, but in England and America botanists have not, as a rule, regarded these statements with favour. My friend, Professor Farlow, has tried a few experiments with the American Podisomæ, but, as far as I know, no one in this country has taken the trouble to put the matter to the test of experiment. For my own part, it may be said that, having conducted upwards of a hundred cultures during the past two years, I have no doubt whatever upon the subject. If heterœcism be shown to exist with some half-dozen species, it is all we for our present purpose

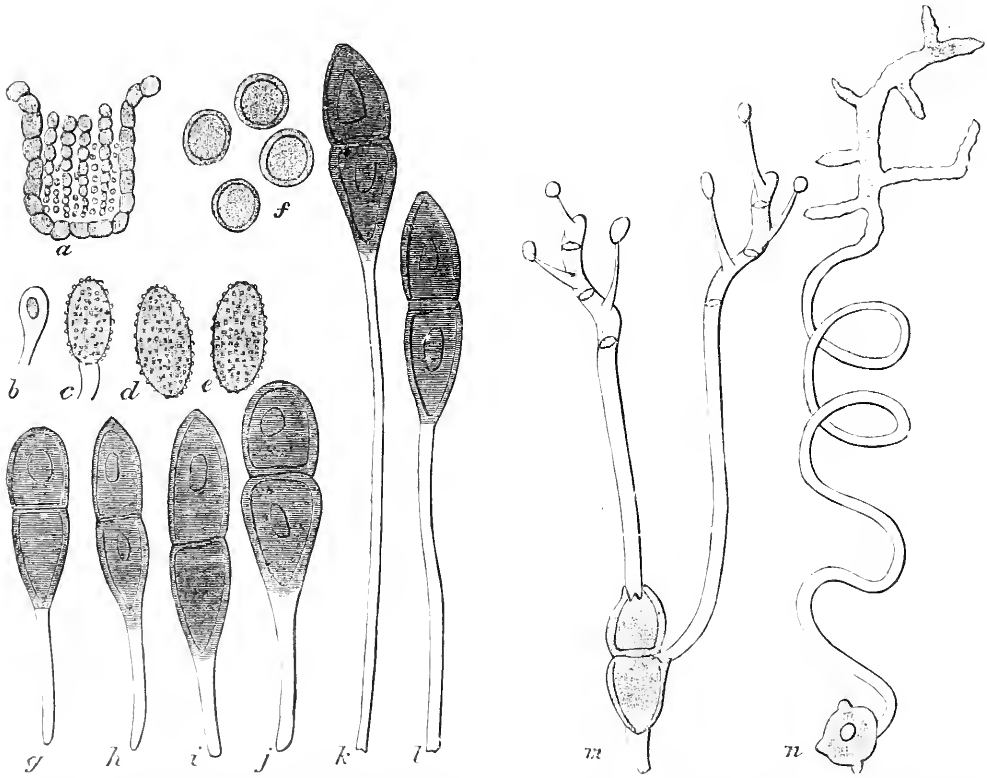


Fig. 135.—*a*, *Æcidium berberidis* section; *b c*, young spores of the uredo of *Puccinia graminis*; *d e*, mature spore of the uredo of *Puccinia graminis* (camera); *f*, spores of *Æcidium berberidis* (camera); *g h*, teleutospores of *Puccinia graminis* (camera); *i j*, teleutospores of *Puccinia magnusiana* (camera); *k l*, teleutospores of *Puccinia arundinacea* (camera); *m*, teleutospore of *Puccinia magnusiana* germinating, each segment of the spore has thrown out a germ-tube, the promycelium of De Bary, bearing promycelium spores (April 17, 1882; 48 hours); *n*, spore of *Æcidium berberidis* germinating.

require, and we are putting ourselves in a hypercritical position, if we refuse to believe what competent observers assert, simply because we have not ourselves actually seen it in all the other instances. Æcidium ; Podisomæ, Rœsteliæ ; and Peridermium, Coleosporium. Surely these instances are enough to convince us that heterœcism does exist amongst the uredines. A far more fruitful source of error has

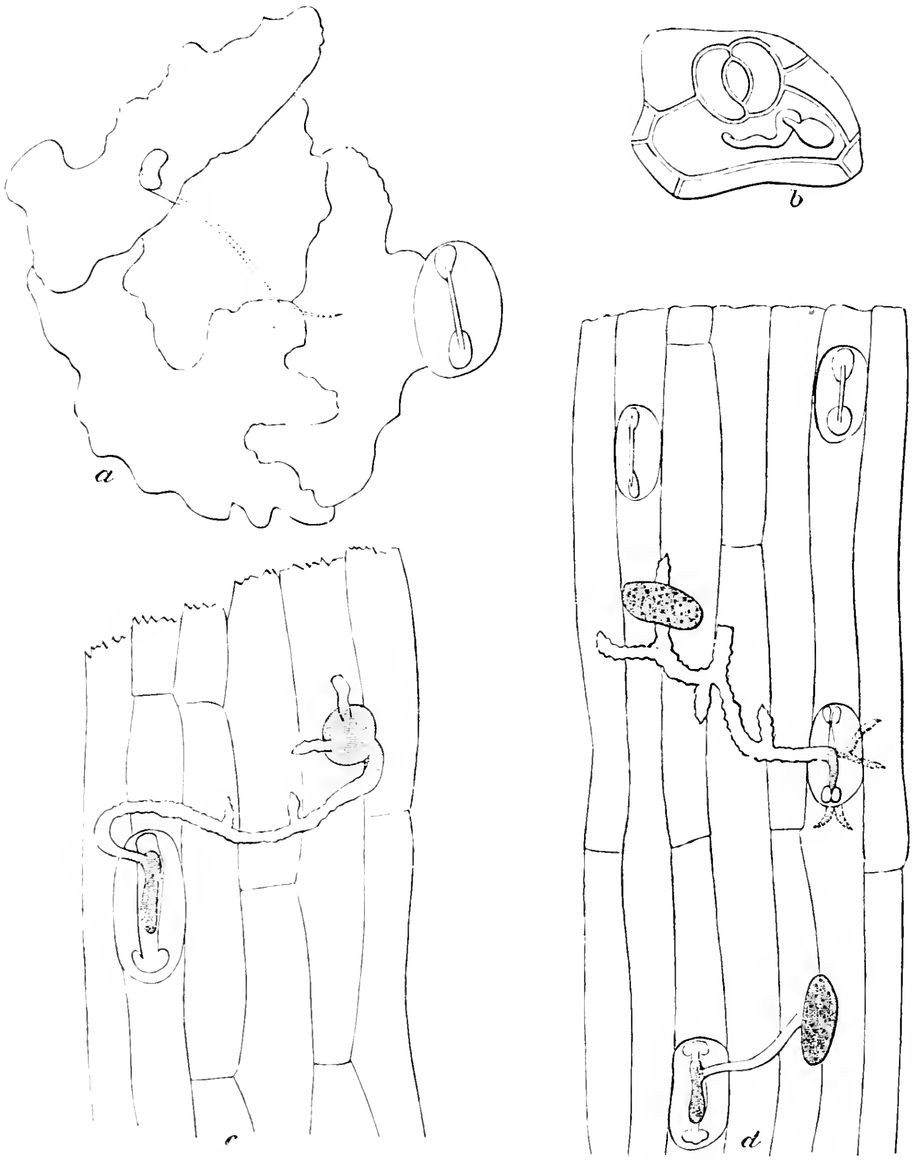


Fig. 136.—*a*, Promycelium spore of *Puccinia lychnidearum* germinating upon the cuticle of *Lychnis dioica*. The germ-tube has penetrated one of the epidermal cells, and is advancing beneath three others (July 12, 1882 ; camera) ; *b*, promycelium spore of *Puccinia graminis*, which has penetrated an epidermal cell of *Berberis vulgaris* (24 hours) ; after De Bary ; *c*, spore of *Æcidium berberidis* germinating upon the cuticle of a young wheat plant ; the germ-tube has just entered a stomatum sown on leaf at 8.45 P.M., July 17 ; sketched by camera at 5.20 A.M. on the 18th ; *d*, two uredo spores of *Puccinia graminis* germinating upon the cuticle of a wheat leaf ; the germ-tube of the lower spore has just entered a stomatum ; in the upper spore the process is more advanced ; July 18, 1882 (camera).—[Spores placed on leaf at 8.45 P.M. of July 17 ; the sketches were made by the camera, the lower at 5.10 A.M., the upper at 9.30 A.M. on the 18th.]

In the course of the experiments above alluded to, Pucciniæ upon one host-plant, have been seen to produce Æcidia upon another ; Æcidia have been seen to produce Uredines ; Uromyces has produced arisen from connecting an æcidium upon one plant, with a uredo occurring upon the same plant. For example, the æcidium upon dock (*Æ. rumicis*) has been thought to be connected with the *Uromyces* *rumicum*, but it is now known that this æcidium is the early state of a puccinia (*P. magnusiana*) upon the common reed.

The bare enumeration of these experiments would be wearisome to the general reader, but a few remarks upon the structure and physiology of the uredines generally, will probably not be uninteresting.

It has long been known that the genus Puccinia has two forms of fruit, the uredo spores, and the teleutospores; that the former are produced in great abundance, and that they germinate with great freedom, as soon as they are mature, and that the teleutospores (puccinia) do not germinate until after a longer or shorter period of rest. It has more recently been shown, that when the germinating teleutospores are placed upon a healthy specimen of the proper host-plant, in many instances instead of producing the uredo, they produce an æcidium! and that when the spores of this æcidium are sown upon a healthy leaf of the host-plant instead of reproducing the æcidium, they give rise to the uredo. So that we must regard the æcidium, the uredo, and the puccinia as different forms of the same fungus, although our predecessors looked upon them as being distinct genera. A perfect puccinia is one which has all three states, as for example the species so common upon *Epilobium hirsutum* (*P. epilobii*). In this fungus the æcidium occurs first in spring: then the uredo, and with it, but a little later, the teleutospores (puccinia). In this instance all three forms occur in succession upon the same host-plant. But a puccinia may have all three spore forms, and yet they may not all occur upon the same plant, as for example the *Puccinia graminis*, the wheat mildew. In this the uredo and teleutospores grow upon wheat and various grasses, but the æcidium is confined to the barberry. As this species is very common and well-known, its physiology will be given more freely, as it may be taken as the type of the genus. It must, however, be incidentally remarked that all pucciniæ are not perfect, inasmuch as they do not possess all these three spore-forms. For example, some have the æcidium and puccinia forms only, as *P. anemone*, P. on the common wood anemone. Others have uredo and puccinia only, and no æcidium as far as is at present known, as *P. prunorum*, on the garden plum. Lastly, there is an interesting group in which both the æcidium and uredo forms are wanting, but in which the teleutospores germinate at once, without a period of rest, as in the hollyhock disease, *P. malvacearum*; *P. arenariæ* is another instance of this last-mentioned group.

The earliest state of *Puccinia graminis* is the æcidium state, well-known to microscopists, from its attractive appearance under a low magnifying power. An æcidium, or cluster cup, is, as its name implies, a cup-like structure, full of spores, usually yellow, though sometimes white. These spores are produced in chains, or necklaces, from the bottom of the cup; they are usually globose, and when placed in a damp atmosphere readily germinate by throwing out a germ tube. The cup itself arises from an entanglement of hyaline tubes (the mycelium) ramifying amongst the cells of the host-plant. If a ripe æcidium spore be placed upon the cuticle of the plant, upon which it is destined to complete the course of its existence, it will throw out a germ tube. This germ tube travels over the leaf until it comes to a stoma, into which its extremity is insinuated, and thus the æcidium gains entrance into its host. Once inside, the germ tube is in its proper soil; it luxuriates, and in a few days produces mycelium. This new mycelium exists in the substance of the leaf for from eight to twenty days before manifesting its presence externally. At the end of this period, it does so at first, by producing a sickly yellow spot, which is very soon the place where a mass of spores (uredo spores) are formed, underneath the cuticle at first, but very soon, as they grow, rupturing it. These uredo spores are not like the æcidium spores, formed in chains, but are produced singly, one from a separate branch of the mycelium. If a young specimen of uredo be examined many of the spores will be seen to have attached to them a little piece of the mycelial tube from which they were produced, in this state they constitute the old genus Trichobasis.

The uredo spores vary in shape, in size, and in colour in various species, but they all have this in common that they germinate within a short time of their maturity, but if kept for a week or two they lose this power. When they are placed on a leaf of their proper host-plant they throw out germ tubes, in the same manner as the æcidium spores do, which like them enter through the stomata and form mycelium inside the host-plant. This mycelium in from ten to twenty days reproduces the uredo. It might be thought that as the æcidium spore produced a uredo, a uredo spore would produce an æcidium, but this is never the case. The function of the uredo spore is to reproduce itself and disseminate the fungus to which it belongs with great rapidity. The rust of wheat is the uredo state of the mildew fungus. But the uredo spore has this disadvantage, it does not retain its power of germination for any length of time. The same mycelium which in spring and summer has been actively producing uredo spores, towards autumn in point of time, but in reality dependent upon the maturity of the host-plant, produces another and very different form of spore, the teleutospore, or puccinia. Now these teleutospores or puccinia spores are very much larger than the uredo spores, and instead of being like them simple are two-celled. The puccinia spores are as a rule firmly fixed to the host-plant which bears them. They are too large to be readily diffused by atmospheric agencies. They are typically resting spores—they do not germinate as a rule until the following spring, but lie in a state of quiescence unchanged as the host-plant decays. When spring comes and fresh leaves of their host-plant appear, they germinate and produce small transparent spores (promycelium spores) that are readily carried about by the wind. The puccinia spore germinates by protruding from each of its segments a single short germ-tube (the promycelium), which gives off near its extremity about three tapering branches, each of which bears a single promycelium spore. When these promycelium spores fall upon the leaf of their proper host-plant, they in their turn germinate, but their germ-tubes are very diminutive structures as compared with those of the æcidium and uredo spores. They do not search for the stomata, but bore their way straight through the cuticle of the leaf at the place upon which they fall. The mycelium thus produced in due time (from eight to twenty days) produces the æcidium with which we began. Thus the cycle of the puccinia is completed, and a very interesting study is the life history of a puccinia, and one which can be with care and patience easily observed by the microscopist.

In some species the æcidium has not yet been discovered, as *P. arundinacea* on reed. There are two pucciniæ on the common reed which have been known for many years; one, the above mentioned that is instantly recognised by the very long stalks upon which its teleutospores are borne. The other has heretofore in this country been set down as a variety of *P. graminis*. It is however a distinct and good species. The teleutospores very closely resemble those of *P. graminis*, but the uredo is quite distinct; its spores are of a different shape and are brown, while those of *P. graminis* are orange. But there is another important difference. The uredo of the species in question is provided with a number of bodies called paraphyses, which are not present in the uredo of *P. graminis*. This spring, my friend Mr. Thomas Brittain, of Manchester, paid me a visit, and incidentally mentioned his inability to find *Æcidium rumicis* upon dock, for which he had searched many years. We were driving along a country road at the time, and I remarked that if he looked for it upon the docks growing near the first lot of reeds we came to he would most likely find it. We accordingly pulled up at the next place where reeds were growing that we came to, and, sure enough, upon the only dock growing there was the æcidium my friend was in search of. I also showed him the same æcidium in my garden which I had produced by causing the promycelium spores of *Puccinia magnusiana* to germinate upon *Rumex hydrolapathum*. It will be within the knowledge of those of your readers who have searched successfully for *Æcidium rumicis* that when they have found it, it has been near *Phragmitis communis*. Of course stray promycelium spores may be blown to an almost indefinite distance, but to find the æcidium in plenty, you must search near reeds upon which *Puccinia magnusiana* grew the previous year. Of course there may be reeds without this puccinia, but if my memory serves me, Mr. Brittain said that the reed was not a common plant in his district. It should be remembered that the spores of the æcidium in question falling upon dock leaves will not reproduce the æcidium; this can only originate from the promycelium spores of *Puccinia magnusiana*, and it is equally true that the *Æcidium berberidis* only arises when the promycelium spores of *Puccinia graminis* have gained entrance into a barberry leaf.

The accompanying figures which have been drawn from nature show the various points that have been alluded to—the structure of an æcidium cup, and the manner in which the spores are formed, their mode of germination and entrance into the stomata of the host-plant; the uredo spores and its germination and mode of entrance, the teleutospores *Puccinia graminis*, *magnusiana* and *arundinacea*; the germination of the teleutospore, and the promycelium spores both of *heteræcismal* and *autoæcismal* species piercing the cuticular cells of their host-plants.

It is in the hope that these few remarks may augment the interest already taken by many microscopists on the subject of micro-fungi, that they have been written, especially as in this country the morphological aspects of these organisms have not received the attention they deserve.

CHARLES B. PLOWRIGHT.

King's Lynn.

THE LOESS.

THERE is a deposit, yclept the Loess,
That's puzzled the brains of the *savants* I guess,
It's found in the vale, and a-top of the hill,
'Tis scarcely a clay, and it is not a Till;
No gravelly bed do its sections unfold,
Nor boulder subangular, flattened or rolled;
Strange and unstratified, made to distress,
Is this great deposit we call the Loess.

Would you make its acquaintance, unwilling to lag
Behindhand in knowledge? consult *Geo. Mag.*,
Where Howarth has marshalled his facts in a train,
This "rummy" deposit for once to explain,
By one great débâcle tremenjus of floods!
That tore up the soils, and stirred up the muds,
Making and mixing a liquefied mess,
Which settled and dried, and became the Loess.

Bold Baron Richthofen now stalks on the scene,
To polish off Howarth, so fresh and so green;
The steppes of Mongolia resound to his wain,
And he kicks up a whirlwind of dust in his train,
Which settles on all things, to prove, if you please,
The agent of change is the air and the breeze;
'Tis a dusty deposit, no more and no less,
A windy formation this funny Loess!

Should it prove due to the flood or the gale,
Or the Champions dusty or muddy prevail,

To either result we may well be resigned,
When with instruction amusement's combined.
So ye keep well your temper and never grow cross,
Though hit with the bones of the Mammoth
  or Bos,
We'll fail not to cheer and cease not to bless
That pregnant deposit yclept the Loess.

A. CONIFER.

NOTES ON THE SCHIZOMYCETES.

[*Continued from page* 150.]

No. II.

II. ASCOCOCCUS, Cohn. Cells colourless, very small, round, united in enormous quantity into larger or smaller, globular or irregular families. Families often folded, the folds again crimped, surrounded by a firm, cartilagino-mucous capsule of a rounded form.

The value of Cohn's genus Ascococcus is, in my opinion, just as questionable as that of the similarly named one of Billroth: it is besides doubtful whether or not they are identical. Possibly Ascococcus is only a stage in the development of Micrococcus.

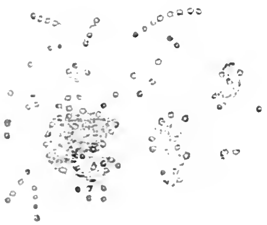


Fig. 137.—*Micrococcus prodigiosus*, Cohn. × 1200.—[By the kindness of Dr. Anthony, of Birmingham, I am enabled to give this drawing made with the aid of a prism and Solles' Homogeneous Immersion 1/16th.—TR.]

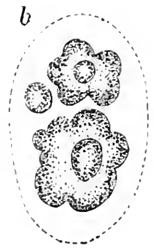


Fig. 138.—*Ascococcus Billrothii* (after Cohn). *b*, the investing capsule.

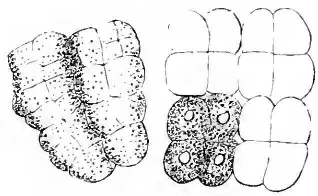


Fig. 139.—*Sarcina ventriculi* (after Lürssen).

17. *A. Billrothii*, Cohn.

Families lump-like, 20–160 μ in diameter, surrounded by a capsule as much as 15 μ thick, covering the surface of the fluid in a thick floccose layer.

Forming a membrane on a solution of acid tartrate of ammonia.

The colonies consist of a well-defined cartilagino-mucous colourless envelope, in which either only one or several families are enclosed. The families are of very varied size and form, solid, composed of numerous extremely minute round cells. The fungus produces in its nutritive fluid a peculiar decomposition; it generates out of the ammonic tartrate contained therein butyric acid and butyric ether, and changes the originally acid fluid into an alkaline one, while free ammonia is evolved.

III. COHNIA, Winter. *Clathrocystis* (Henfrey), Cohn (pro parte).

Cells roundish, in a simple peripheral layer surrounded by a common gelatine, forming hollow, round or afterwards irregular bladders or vesicles, which finally are reticulately pierced. Multiplication of the cells by repeated bipartition; of the families by the protuberance and separation of daughter-families.

As I comprehend it, Cohn's genus, Clathrocystis, embraces both Algæ and Fungi. Since then the generic name was first used for an Alga (*Cl. æruginosa*, Henfrey), it is advisable to leave it for that species and to make the species which belongs to the Fungi the type of a new genus, to which I have given the name of Cohnia in honour of Professor Dr. F. Cohn, of Breslau, who has gained so much distinction in the investigation of the Schizomycetes.

18. *C. roseo-persicina* (Kütz.)
Protococcus roseo-persicinus, Kütz.
Pleurococcus r.-p., Rabenh.; Cooke, "British Freshwater Algæ," p. 6.*
Microhaloa rosea, Kütz.
Bacterium rubescens, Lankester (Q. J. M. S. xiii., 408, pl. 22–3; xv., 206; and xvi., 27, pl. 3).
Clathrocystis roseo-persicina, Cohn.

Cells round, oval, or, by mutual pressure, polygonal, varying from rose to purple-red, reaching $2\frac{1}{2}$ μ in diameter. They form at first small solid families, in which the single cells are bound together by gelatine, while the whole family is surrounded in addition by a gelatinous envelope. Later, the families become larger, globular or ovoid, and finally irregular bodies, which are hollow and filled with a watery fluid, and reach a diameter of 660 μ (= $\frac{2}{3}$ mm. or $\frac{1}{40}$ inch). In these the cells form a simple peripheral layer. These vesicles are often torn or perforated; in the end they present an elegant network, which finally breaks up into irregular rags and tatters.

In marshes, floating on the surface or amongst Algæ and Lemna; often also in a room, in water in which Algæ, &c., are decaying.

The single hitherto known species of this genus is distinguished by its red colouring matter, which is essentially different from that of *Micrococcus prodigiosus*, and is designated Bacteriopurpurin. It is insoluble in water, alcohol, &c., is changed by hot alcohol into a brown substance, and is moreover characterised by its optical behaviour. For in the spectroscope it shows strong absorption in the yellow, less in the green and blue, as well as a darkening in the more refrangible half of the spectrum.† Each individual cell is surrounded by a dense, almost cartilaginous membrane; its contents are at first homo-

* This, as well as *Micrococcus prodigiosus*, is included by M. C. Cooke among the Algæ. The reasons for considering them as Fungi will be given later on. Cooke's description, which is annexed, will be seen to be incorrect or defective in several particulars. "*Pleurococcus roseo-persicinus*. Aquatic. Cells unequal ('0015 — '004 mm.), cloudy, single or binate, tegument hyaline, collected on a thin, rather gelatinous, peach-rose coloured stratum. Investing submerged aquatic plants. The cells are usually agglomerated in spherical or elliptic masses."—TR.

† For the spectrum see Q. J. M. S., xiii. 425.—TR.

geneous, but as it grows older one or more dark granules* can be observed in it, which are nothing else but pure eliminated sulphur.

[By the kindness of Mr. J. Levick, the President of the Birmingham Natural History Society, I have been favoured with specimens of a supposed Alga from his famous garden pond (the home of so many rarities), which I at once recognised to be this species. It occurred in great quantity, floating freely in the water when young, but apparently sinking among the débris at the bottom when old and tattered; its beautiful peach colour renders it very striking among the green Algæ with which it is frequently entangled.—Tr.]

IV. Sarcina, Goodsir (*extended*).

Cells roundish, dividing in two or three dimensions of space. Daughter-cells connected for some time, forming small solid families or plates, which are often again in their turn united to form larger colonies. Families usually consisting of four or a multiple of four cells.

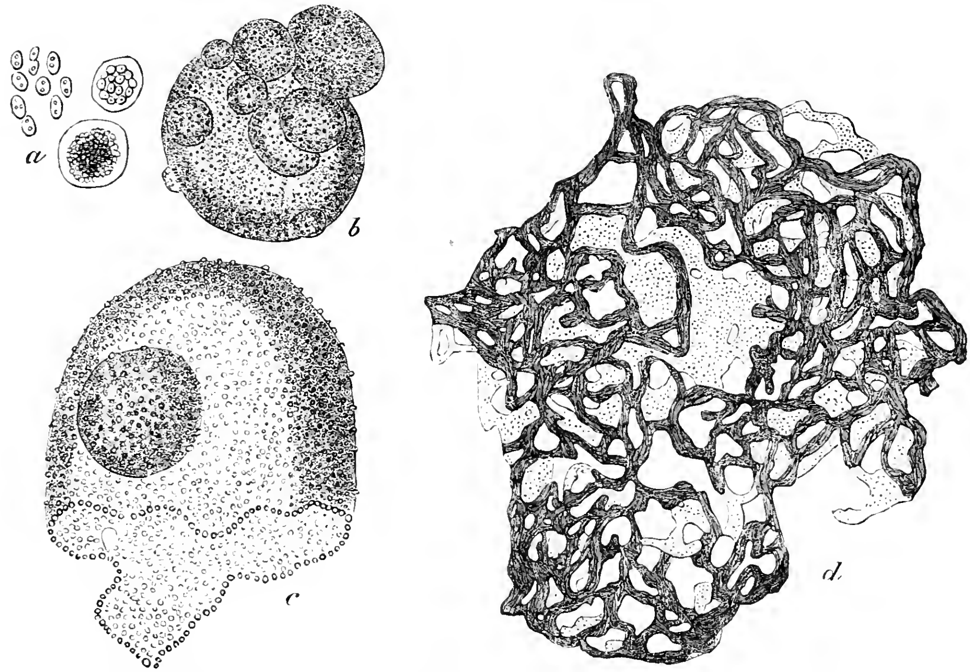


Fig. 140.—*Cohnia roseo-persicina* (after Cohn). *a*, single cells, often subdividing, afterwards forming families surrounded by gelatine; *b*, an older family; *c*, part of *b* × 300; *d*, an old reticulate family.

19. *S. ventriculi*, Goodsir.

Merismopedia Goodsirii, Husem.

M. ventriculi, Robin.

Cells roundish, united in groups of four, eight, sixteen, or a few more, flattened at the points of contact, forming little cubes which are rounded off at the corners. Individual cells reaching 4 μ in diameter; colonies constricted at the partition walls of the cells, united in their turn to form larger masses. Cell-contents greenish, yellowish to reddish-brown, faintly sparkling.

In the stomach of healthy and diseased persons, and the higher animals; also occurring in other parts of the body.

20. *S. urinæ*, Welcker.

Merismopedia urinæ, Rabenh.

Cells very small, 1·2 μ in diameter, united in families of from 8 to 64; eight-celled families 2·3 μ, 64-celled 4·5 μ in diameter.

In the bladder.

21. *S. litoralis* (Oersted).

Erythroconis litoralis, Oersted.

Merismopedia litoralis, Rabenh.

Cells round or, before division, oval, 1·2 μ, seldom 2 or more μ in diameter, united into families of four, six, or eight, &c., which in their turn form larger

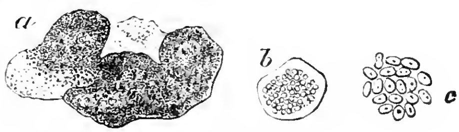


Fig. 141.—*a*, a small family rather broken up; *b*, a young group; *c*, the cells. From Mr. Levick's specimens.

colonies (as many as 64 groups of four in a colony). Plasma colourless, but in each cell from one to four red granules of sulphur.

In putrefying sea-water.

22 *S. Reitenbachii* (Caspary).

Merismopedium Reitenbachii, Caspary.

Cells round, before division ovate-elliptical, about

* The granules are the "loculi" of Lankester, and the "spores" of other authors.—Tr.

$1\frac{1}{2}$ to $2\frac{1}{2}$ μ in diameter, at the time of division prolonged to 4 μ, seldom single or in twos and threes, for the most part united in fours or eights, less often in sixteens or more. Cell-wall colourless, lined with a rose-red layer of plasma.

On submerged parts of water-plants, on decaying pieces of the same, and floating free in fresh water.

The families contain at most 32 cells; those consisting of 8 round cells measure 9·9 μ in length, 4·9 μ in breadth; plates of 8 cells in the act of separating are 6·6 μ long, 4·9 μ broad; the same of 16 cells have a length of 16·6 μ, and a breadth of 10·7 μ.

Perhaps also *Merismopedia violacea* (Bréb.) Kützing, belongs to the Fungi. It agrees closely with *S. Reitenbachii* in size, but is distinguished by its colour, and especially by the fact that the cells are not unfrequently united in one family to as many as 128. Very similar but hitherto, I believe, only found in Sweden is *Merismopedium chondroideum*, Wittr.

23. *S. hyalina* (Kütz.).

Merismopedia hyalina, Kütz.

Cells round, almost colourless, $2\frac{1}{2}$ μ in diameter; families usually composed of from 4 to 24 (seldom more) cells, reaching 15 μ in diameter.

In marshes.

Sarcina renis, Hepworth (Micr. Journ. v. 1857, p. 1, pl. i. fig. 2) is coloured a lively green, and besides looks very little like a Sarcina, and shall therefore only be mentioned.

Besides the foregoing species of Sarcina, Fungi belonging to this genus have been observed on various substrata:—on cooked potatoes (in little chrome-yellow heaps), on cooked white of egg (in clear yellow spots), also in fluids, even in the blood of healthy and unhealthy persons.*

W. B. GROVE, B.A.

(To be continued.)

NOTES ON DAMPING THE PUPÆ OF LEPIDOPTERA, WITH OBSERVATIONS ON THEIR MANAGEMENT IN CONFINEMENT.

By WILLIAM J. V. VANDENBERGH, F.M.S., &c.

[*Continued from page 179.*]

I DO not damp my pupæ during the colder winter months, as I consider that the chance of their becoming too dry is more than counterbalanced by the possibility of a frost suddenly occurring and converting the recently introduced moisture into ice; a consummation which, as I have before hinted, would be exceedingly undesirable.

When damping is practised the degree of moisture should, as far as possible, always be uniform, and I have seen in operation an ingenious, although simple, method of doing this. The whole of the moss, &c., inside the pupæ cage is kept uniformly damp by means of a few strands of ordinary worsted, one end of each strand being deposited in a cup or bottle of water placed outside the cage, and the other end placed among the moss and leaves &c., within it. Each strand of worsted sucks up the water, in the same way as a lamp-wick absorbs oil, and distributes it in minute quantities over the contents of the cage.

This is a most useful arrangement, as, to regulate the degree of dampness it is only necessary to add to or diminish the number of worsted strands, of which four or five are generally sufficient for a moderate-sized cage; the number however will of course greatly depend upon the state of the weather, and the position of the cage as regards wind, sunshine, and other like matters, the regulations as to which can only be learned by practical experience.

This means of damping is more simple and reliable than any other I am acquainted with, and it would be exceptionally valuable to those collectors who are in the habit of "forcing" their pupæ (i.e. inducing the imago to emerge before the natural time).

There can be no doubt that the degree of success attained by some collectors in breeding perfect insects from hybernating pupæ is due in a great measure, not only to the process before mentioned, but to the material into which the pupæ are placed.

Many lepidopterists prefer cocoa-nut fibre (sometimes mixed with other substances) for this purpose, but personally I prefer layers of moss, as it allows freer ventilation and is not so conducive to "mould."

Before being placed in the pupæ cage, the moss should be slowly baked, in order to kill ants, centipedes, slugs, &c., the presence of which would probably be injurious to the pupæ.

Ordinary larvæ cages are often used for keeping pupæ and answer the purpose very well, if kept under cover; but if the collector intends to keep his pupæ exposed to the weather, it is desirable to use a substantial box, such as will not readily warp or crack, and thus render the removal of its contents necessary at any time.

Care should be taken to perforate the bottom of the cage with numerous small holes to allow the escape of excessive moisture, and it is advisable to place a layer, about two inches in thickness, of shingle or small stones upon the bottom; an inch or two of good garden mould (or sand, if preferred), should be deposited upon the stones, and upon this the moss may be placed.

Having thus completed the preparation of the cage, the pupæ may be introduced and covered with a thin layer of broken moss, upon which may be placed another lot of pupæ. Care should, however, be taken not to overcrowd the cage or bury any of the pupæ too deeply, as, if this is done, it will probably result in the breeding of "cripples."

This is, to say the least, a very simple and inexpensive process, and I have always found it to answer as well as any other at present in use.

Young and inquisitive collectors often exhume the contents of their pupæ cages every few weeks for the purpose of ascertaining "how they are getting on." I have even seen the happy possessor of a considerable

* Compare Cohn, "Beiträge zur Biologie," vol. i. part 2, page [illegible]. It is in the volumes of that work that the foundation of [illegible] is laid.]

number of pupæ produce them one after another (in spite of remonstrance from myself), and twist the posterior extremity of each from side to side, in order to test their vitality. The result of this may easily be conjectured; the young gentleman referred to afterwards informed me, with every emergence of intense disgust, that when the time for the appearance of the perfect insects arrived, he discovered, to his horror, that about eighty per cent. of them were defunct! He furthermore favoured me with the information that, in his opinion, attempting to rear pupæ was a waste of time!

Even to the mere collector of insects breeding is the best means of obtaining perfect specimens, and it has another great advantage, viz., that it often induces the collector to become an entomologist in the true sense of the word, by bringing the habits of insects constantly under his notice.

Most lepidopterists have a method of keeping their pupæ closely allied to that which I have already described, and when the cages are transferred to a greenhouse during the cold weather, so that they will be secure from frost, the damping operations may be continued with advantage throughout the winter.

I personally, however, prefer to allow my pupæ to feel the full effects of the winter, except so far as they are protected by their cages, and when my larvæ go down beneath the mould, and enter the pupæ state, I often allow them to remain in the same cage during the winter.

Other later larvæ can easily be reared in the cage and be allowed to descend into the same mould to pupate, if the collector is careful, without any inconvenience; and I may again remark that I regard leaving pupæ as far as possible undisturbed as an item of great importance in successful breeding.

The Rev. J. Greene, M.A. (the well-known lepidopterist), appears to be of opinion that the removal of the pupæ of the smaller species of lepidoptera from their cocoons is advisable ("Insect Hunter's Companion," 2nd edit. 1880, p. 46); but such an operation would have to be conducted with great care, and I am afraid, in the hands of an inexperienced collector, would probably produce fatal results to the pupæ.

Taking all things into consideration, I have no hesitation in saying, that, as a rule, the best and by far the less troublesome course is to let the pupæ remain in their natural condition, except as regards damping; and if the collector is careful he ought by this course to successfully rear a very large proportion of them.

"Forcing" is the name usually applied to a process much in vogue with entomologists, by which the imago or perfect insect is induced to emerge from its pupæ before the natural time.

This result is achieved by artificial heat, generally assisted by constant damping, and some species will readily emerge when placed under these unnatural conditions, whilst, strange to say, others do not appear to be influenced in the slightest degree. There are many reasons why it is inexpedient to force pupæ; among others, if the collector is desirous of obtaining fertilised eggs from freshly emerged specimens obtained by this means, he will, in all probability, experience very considerable difficulty in inducing copulation; and even if impregnated eggs are laid, and the larvæ hatch in due course, the buds of their food plant will possibly not yet have opened, and the consequence will be that the young larvæ will perish by starvation.

The reader will find much valuable information upon the subject of pupæ in general in the "Insect Hunter's Companion," and also in Dr. Knaggs' "Lepidopterists' Guide."

RECREATIONS IN FOSSIL BOTANY.

Astromyelon and its Affinities.

By James Spencer.

This new genus of fossil plants was first described and introduced to the scientific world so recently as the year 1878, by Professor W. C. Williamson, F.R.S., in his ninth memoir: "On the Organization of the Fossil Plants of the Coal Measures." Fragments of Astromyelon, however, had been previously described both by Mr. Binney and Professor Williamson as Calamitean, on account of their close resemblance to similar structures in Calamites. Since the publication of the above memoir, our knowledge of this interesting genus has been largely increased by the discovery of a large series of additional specimens, by myself and other workers in fossil botany. I purpose in this paper to give a short sketch of what is known about Astromyelon and of its nearest relations.

The Astromyelons have been named and described solely from the physiological and histological examination under the microscope of specimens obtained from the coal-balls found in the Halifax Hard Bed coal, and in a similar coal found in the neighbourhood of Oldham. In consequence of not having been found in an ordinary fossil state, like most of the other coal plants, very little is known about their morphology, that is, about the external appearance which they presented when growing in their native soil. But, so far as we do know about them, they appear to have been for the most part small herbaceous plants like Asterophyllites and the smaller kinds of Calamites.

The Astromyelons are so frequently met with in our coal-balls, where they are as common as, if not more so than, Calamites, that it is strange that they have not hitherto been recorded as having been found in an ordinary fossil condition, as impressions on shale or as sandstone and ironstone casts. This is probably owing to their impressions having a close resemblance to Calamites, while their sandstone casts might be easily confounded with those of Calamites, Lepidodendron, and other fossil plants. Being convinced that they must occur as ordinary fossils, I have lately subjected all specimens of fossil plants which I have met with to a more careful scrutiny, and the result has been that I have found specimens of Astromyelon both as sandstone casts and as impressions on shale.

A short time ago, while geologising with a friend in the flagstone quarries of Ringby, near Halifax, I saw a beautiful fragment of Astromyelon on the face of a flagstone. It was the impression of a longitudinal section of a portion of the stem, which showed the structure almost as perfectly as a coal-ball section. The mural arrangement of the cells of the medulla—so familiar to us in our sections—presented the appearance of a wall of white bricks, while the basement-layer and copings of the wall were represented by the narrower and darker and more compact layers of the ligneous zone. The fragment was impressed on a filmy layer of shale, and broke into smaller fragments when I attempted to secure it. It is evident from this fact that the remains of this plant must either have been overlooked or confounded with those of other fossil plants.

The coal-ball material in the neighbourhood of Halifax has yielded a great variety of these Astromyelons.

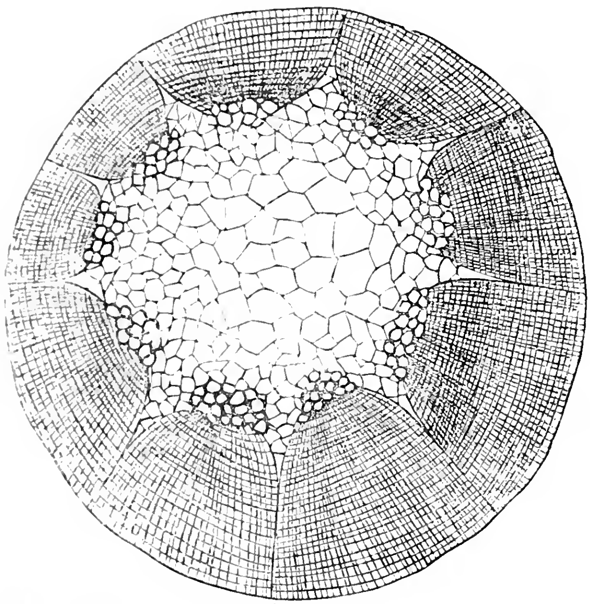


Fig. 142.—Astromyelon, Williamson. From a specimen in writer's cabinet. × 24 diam.

The transverse section of a typical specimen shows a central parenchymatous medulla, surrounded by a woody cylinder, which is composed of a regular series of primary wedges. These wedges are almost identical in structure with those of Calamites, with the exception of the absence of the canals at their inner ends, which are also somewhat more obtuse than are those of Calamites. The number of wedges forming the exogenous cylinder varies from five or six in very young specimens, to from nine to thirteen in more mature forms. In Calamites the wedges are more regular in size, and vary from eleven to sixty or more in number, according to the size of the plant.

In Astromyelon the wedges vary considerably in size, sometimes even in the same plant. Each wedge is composed of a number of laminæ, or rows of vessels, which are arranged in a radiating manner, and each lamina is again composed of a number of

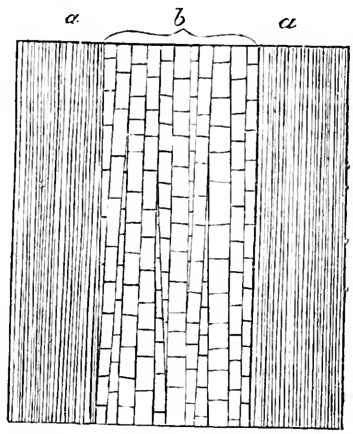


Fig. 143. — Longitudinal section of Astromyelon. *a*, woody cylinder; *b*, pith.

Fig. 144.—Part of one of the tubular spindle-shaped vessels of the ligneous cylinder of Astromyelon.

vessels, which increase somewhat in size, from the apex of the wedge outwards to the base. In young specimens, the vessels are larger and more various in size and form than is the case in more mature stems, and the wedges are also more open. In older stems, the vessels are smaller, and more regular in size, and the exogenous zone is more firmly knit together, which seem to have been effected by the growth of new vessels and cells amongst the older ones, and the formation of new wedges, in a regular exogenous manner. The central medulla forms a solid pith, the cells of which are generally largest in the centre, but become smaller as they approach the woody wedges, and fill up the spaces between them; and being very thin walled they give a very light appearance to the pith, which forms a strong contrast to the darker wedges of the ligneous zone, causing that star-like appearance of the pith from which the plant derives its name of Astromyelon.

The Astromyelons differed also from Calamites in their mode of branching. They had branches like ordinary exogenous plants, while those of Calamites were articulated to the stem, and were derived solely from the bark. In the longitudinal sections of the two plants a very striking difference is seen in the form and structure of the pith, which is fistular (hollow like a reed) in Calamites, with only a thin lining enveloping the ends of the wedges, whereas in Astromyelon it forms a solid structure. In the latter plant the pith extends continuously throughout the stem and branches, but in Calamites it only forms a thin lining round the chambers into which the stem of the plant is divided. The structure of the pith is very similar in the two plants. In the centre of Calamites it partakes more of the character of a true parenchyma, but in Astromyelon and between the wedges of Calamites it is composed of long brick-like cells which form a higher stage of cell structure, and it is known under the name of parenchymatous tissue. The beautiful regularity in which these long brick-like cells are laid gives to longitudinal sections of the pith the mural aspect which I have already alluded to. This mural parenchyma, so commonly found in modern exogenous plants, has been noticed by Professor Williamson as forming a most conspicuous feature in many of our fossil cryptogamic plants.

The Astromyelons may be divided into two great groups, namely, the normal one, with the large star-like pith, and another in which the pith is entirely absent. There is such a striking difference between these two forms, that were it not for the fact that I have a large series of specimens showing a complete gradation between them, they might be ranked as two separate species. Some of my specimens have the wedges clearly formed, but the pith has disappeared; others show a continuous cylinder without either wedges or pith. In both these cases it is very probable that the pith has been lost, either during the process of fossilisation or else before that process began. There are other cases which exhibit a gradual enlargement of the woody cylinder at the expense of the area of the pith, which gradually becomes less and less, until we arrive at specimens which present to our view a solid cylinder of woody tissue, and with scarcely a trace of the medulla. It will be seen from the above that the term Astromyelon is not a very appropriate one to a large number of specimens comprehended under that name, but this is one of the inevitable consequences of the progress of discovery. It is a common occurrence in geology for names and even theories to be outgrown by the accumulation of new facts. However incongruous it may appear to some people to call plants which have neither pith nor woody wedges, nor even the place of the pith, by the name of "star-like pith," yet it is better to do so than to introduce many new names, which in course of time may become as inappropriate as the one they supplant, and which will only tend to perplex and hinder the student. By-and-by, when our knowledge of the morphology and physiology of these fossil plants becomes more perfect, these present names, which are only provisional, will have to give place to more appropriate ones.

(*To be continued.*)

THE WILD FLOWERS OF 1882.

By A. Kingston.

THE remarkably mild winter and spring through which we have passed have been so much the subject of comment that the influence of this mildness in promoting an unusually early maturity of flowering plants can hardly be a matter for any great surprise. Nevertheless, having made a definite record of the earliest flowering period of a good number of species observed in this (Royston) district, I have thought that the extracts from such record which are given below might not be altogether devoid of interest: *Chelidonium majus*, April 17th; *Reseda lutea*, end of May; *Helianthemum vulgare*, middle of May; *Polygala vulgaris*, April 17th; *Stellaria Holostea*, March 25th; *Arenaria serpyllifolia*, April 24th; *Cerastium arvense*, April 9th; *Linum catharticum*, May 1st; *Hypericum perforatum*, June 20th; *Lotus corniculatus*, end of May; *Astragalus hypoglottis*, May 15th; *Lathyrus pratensis*, middle of June; *Spiræa Filipendula*, June 1st; *Geum urbanum*, April; *Potentilla anserina*, first week in May; *P. reptans*, middle of May; *Rosa canina*, middle of May; *Cratægus Oxyacantha* ("may"), occasionally in sunny places last week in April; *Sanicula Europæa*, middle of May; *Pimpinella saxifraga*, in May (solitary specimen); *Daucus Carota*, end of May; *Scandix Pecten*, in April; *Sherardia arvensis*, in April; *Scabiosa Columbaria*, end of May; *Crepis virens*, end of May; *Lapsana communis*, June 1st;

Carduus nutans, May 1st; *Filago Germanica*, May 1st (solitary flower); *Cineraria campestris*, May 1st; *Chrysanthemum leucanthemum*, first week in May; *Campanula glomerata*, May 29th; *C. hybrida*, middle of May; *Veronica Chamædrys*, middle of April; *Verbascum Thapsus*, middle of June; *Anagallis arvensis*, middle of May; *Thesium linophyllum*, first week in June; *Orchis ustulata*, butterfly orchis, bee orchis, and *Gymnadenia conopsea*, last week in May; *Iris Pseudacorus*, middle of May.

It may be observed that the great majority of the above-named species are perennial, which by the mildness of the season would have an increased growing period previous to flowering, and that the dates given show the flowering period to have been, on an average, nearly a month earlier than usual. As an instance of the effect of the favourable season we have had upon the rarer species, I may mention that the somewhat rare *Astragalus hypoglottis*, or purple milk vetch, and the elegant *Spiræa Filipendula* have this year been so abundant on Royston Heath as almost to cover the ground in some parts; and to a less extent the same remark applies to the rare *Cineraria campestris*, to the still rarer *Thesium linophyllum* (one of the rarest species of this country), and especially to the pretty little *Asperula cynanchica*: also to the rare *Orchis ustulata* and *Gymnadenia conopsea*: while the interesting *Ophrys apifera* (bee orchis), of which there is no record for Royston Heath in "Flora Hertfordiensis," appears this year at several different spots on the Heath a considerable distance apart; and at two of these spots it was so common that it would scarcely be an exaggeration to say that it could be gathered by the handful. I was somewhat puzzled by their sudden and total disappearance at one of these spots, not a vestige of the foliage being discoverable a week after I had found them in such abundance. Had they been gathered by passers-by, one would expect to see at least some remnant of the plants. A flock of sheep had just been grazing over the spot. Does any one know if sheep are fond of orchidaceous plants? I may add that from my own observations the present promises to be one of the most favourable seasons we have had for many years for searching for rare or uncommon species. I must add to the above list the following characteristic species: *Thalictrum minus* and *Antennaria dioica*, first week in June; *Galeopsis [illegible]*, June 29th. The orchidaceous tribe, always a capricious family, have this year not only upset the established record of local "floras," but the commoner species, such as *Orchis maculata*, have been as common as weeds by the roadside. The pretty bluebottle or cornflower (*Centaurea cyanus*) has extended its habitats enough to satisfy its royal admirer the Emperor of Germany, while the beautiful *Chrysanthemum segetum*, or corn marigold, has yielded a wealth of golden blossoms which even our grand [illegible] would fain stop to admire.

MICROSCOPY.

Blood Corpuscles.—The size and shape of the blood corpuscle is apportioned to the form of the circulation; but the nutrition of the osseous system is evidently in relation as the lacuna of bone and the blood disc, evinced by careful microscopic measurement, approximate.—*James Foster, Carlisle.*

Mounting Entomostraca.—I have lately mounted with success, bladderwort and various specimens of pond life in carbolised water. Procure a small quantity of carbolic acid in crystals from the chemist, add a drop or two of water to facilitate melting by gentle heat over a gas flame, and pour out say five or six minims into half a pint of distilled water. The fluid may be placed with the object in a shallow cell, formed by a tin ring cemented to the glass slip with brown cement, and the glass cover fixed with the same material. After the cell has thus been sealed and allowed to dry, place on turn-table, and run on a thick ring of white zinc cement. By this process the tissues do not shrink as with glycerine jelly, and my specimens mounted a few weeks ago, preserve a very natural appearance.—*G. J. Johnson, Hale, near Manchester.*

The Sign ×.—Allow me once more, and only once, to reply to Mr. Kitton's remarks on the above sign. I quite follow, and to some extent appreciate, his argument, but I wish simply to answer the question which he puts, viz.: "Why does T. R. J. maintain that this sign means more than amplification?" It is for this purpose, that the public may not be misled, and microscopists misrepresented by a diagram purporting to represent an object × 500 diam.; while it is but an enlargement of one × 50. Those who think this correct will not be reached by any argument of mine; but if it is not correct, then it should be explained why it is not. This I endeavoured to do in my former papers. If my reasons are not sound, will some one else supply such as are so? We all know that magnifying powers and defining power are distinct things, though they go very much hand in hand. Now while it would have been correct in 1782 to exhibit a diagram as × 500 diam., with as little definition as one now magnified by a much less power (because it would faithfully represent the object as then seen), yet such a diagram would not faithfully represent an object × 500 diam. in 1882. Magnifying power is of course abstracted by "not a variable quantity," but practically it is so, and all I contend for is that a diagram said to represent an object × 500 in 1882 ought to be a faithful representation of that object as seen under an average microscope of the same date. I might I think successfully combat some of Mr. K.'s arguments, but I content myself with answering his question.—*T. R. Jones.*

THE MICROGRAPHIC DICTIONARY. 4th EDITION.—We have received Parts viii. to xiii. inclusive of the new issue of this valuable work. The importance attached to it will have been evidenced by the correspondence relating to sections of coal. The fourth edition is edited by Dr .J. W. Griffith, the Rev. M. J. Berkeley, and Professor T. Rupert Jones.

STUDIES IN MICROSCOPICAL SCIENCE.—Mr. Arthur C. Coles' new weekly publication is one of the most welcome of the many we receive for notice. No. 13 is a departure from the plates of its predecessors, in giving a very fairly-executed lithographed plate of the human kidney, instead of the usual coloured section. We should add that one of the chief values of these "studies" is the Bibliographical list of papers, &c., relating to each.

CLIP FOR MOUNTING.—Mr. John Beadle, of No. 4 Victoria Street, Kendal, has sent for our inspection a very ingeniously contrived wire clip for mounting microscopical specimens. It is one of the best and simplest devices we have seen.

JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY.—The June part contains papers as follows: "Note on the Spicules found in the Ambulacral Tubes of the regular Echinoidea," by Professor F. Jeffrey Bell; "The Relation of Aperture and Power in the Microscope," by Professor Abbe; "The Bacteria of Davaine's Septicæmia," by G. F. Dowdeswell, M.A.; besides a capital summary of eminent researches relating to zoology and botany, microscopy, &c., including original communications from fellows and others. The part for August contains papers as follows:—"On some Micro-organisms from Rainwater, Ice, and Hail," by R. L. Maddox; "Description of a simple plan of Imbedding Tissues, for Microtome cutting, in semi-pulped unglazed printing Paper," by B. W. Richardson; "Note on the Rev. G. L. Mill's Paper on Diatoms in Peruvian Guano," by F. Kitton.

THE MICROSCOPICAL SOCIETY OF VICTORIA.—We have received Nos. 1 and 4 of the Journal of the above Society, containing papers by Dr. T. S. Ralph (president) on "Human Blood"; by Mr. W. M. Ball on Hydroida from south-eastern Australia; Microscopical structure of Igneous Dyke rocks in North Gippsland, by Mr. A. W. Howitt; papers on matters relating to mounting, &c., by Messrs. F. Barnard, W. M. Bale, W. H. Wooster, &c. The illustrations are excellent, and the Journal will compare favourably in its get-up with any in Great Britain.

CUTTING SECTIONS OF COAL.—Mr. Griffiths can scarcely be acquainted with Professor Reinsch's latest work, "Neue Untersuchungen über die Mikrostruktur der Steinkohle," &c., or he would not assert that little was to be seen in coal. I have had the pleasure of examining with the Professor a series of slides which he had prepared, and from which many of the drawings in the above-named work were made. As I believe the book is but little known in this country, a brief description will enable the readers of SCIENCE-GOSSIP to judge how far I am correct in stating that sections of coal are not devoid of interest. It is a small quarto volume, consisting of 124 pages of text and 57 plates, containing about 500 figures drawn on stone and printed by the author, it describes and illustrates the numerous organisms detected by the author in coal. These do not consist of the remains of large plants like the fragments occurring in lignite, but are microscopic protophyta, and are arranged in the following classes:—Chroococciten, 2 genera; Plasmien, 23 genera; Racostromien, 8 genera; Grammitoiden, 6 genera; Trichoden, 5 genera; Asterophragmien, 8 genera; Blastophragmien, 2 genera; making a total of 54 genera. It is not however the question as to whether coal will repay the trouble of preparing sections of it but whether the Micrographical Dictionary was correct in stating that coal could be softened by macerating it in a solution of carbonate of potash. I, as one of the "sapient" individuals who credited the assertion of the writer that it would become sufficiently soft to be cut with a razor, tried it and published my want of success. This called forth numerous letters, all of which recorded failures. At last Mr. Griffiths comes forward and relates an anecdote of a pupil of his, as a jeer at those who were credulous enough to believe the assertion of the Micrographical Dictionary and telling us that our non-success arose from our own stupidity, we should have tried lignite and not coal; but as I wanted to make sections of the latter it was of little use telling me how lignite could be cut, it would therefore have saved some trouble if the Micrographical Dictionary had stated that carbonate of potash would not soften anthracite or hard coal. I do not imagine that a microscopist (even one who does not claim to be advanced) would require to be told that the plan of treating vegetable tissue would not succeed with a brickbat; but surely if I am told that a piece of quartz can be pierced with an ordinary steel drill, and on trying it, I find it will not do so, I am justified in considering that the recipe is worthless, and my informant afterwards telling me that he meant a combination of quartz with soda does not add to its value. The words of the poet are not inapplicable to the book in question:

> "If to its text some trifling errors fall,
> Look at its plates and you'll forget them all."

—*Fred. Kitton.*

WHAT BIRD?—A bird nearly twice the size of house-sparrow, head and upper part bluish; throat, breast, &c., reddish-brown, perhaps more correctly red. Note a constant repetition of a sound resembling the words chee-whit, chee-whit. Station generally upper parts of trees in my orchard.—*E. H. R.*

ZOOLOGY.

Parasites on Dytiscus marginalis.—I have to thank Mr. Henry Blake for his reply in Science-Gossip for April, to my query on this subject appearing in your issue for February. I have no doubt the parasites are the immature state of a water mite (Hydrachna). I see that Professor Westwood, in his "Modern Classification of Insects," vol. i. p. 105 (published 1839)—under the family Dyticidæ, says, "Notwithstanding their large size, these insects are subject to the attacks of a minute parasite, described by M. Audouin under the name of *Achlysia Dytici*, but which the recent investigations of M. Duges have proved to be the immature state of one of the water-mites (Hydrachnæ) and which affixes itself to the thin membrane with which the upper surface of the abdomen is covered." But I have found, since I first sent the query to Science-Gossip, that in Cuvier's "Animal Kingdom," edition 1854, which is also edited by Westwood, there is a plate illustrating the various stages of *Hydrachna globulus*, with a note as follows:—"From the valuable discoveries lately made by M. Duges, it appears that these water mites undergo metamorphoses accompanied by a complete change of form, the larvæ having a very large head and six legs, whilst the pupæ are inactive, attaching themselves by a single pair of legs to the bodies of other aquatic insects, and consisting, as it were, simply of an oval bag with a narrow neck, the insect in this state having been formed by M. V. Audouin into the genus Achlysia, and specifically named *A. Dytici* from taking up its residence beneath the elytra of the water beetle (*Dyticus marginalis*). They also attach themselves to the slender filaments composing the tails of the water scorpions (Nepa and Ranatra)." The pupæ figured are about the size of the parasites I found on *D. marginalis*, and very similar in form; I therefore conclude they were the pupæ of *H. globulus*. The figure of the larva given in the "Animal Kingdom" shows the two mandible-like organs mentioned by Mr. Blake (which I should think are probably the first pair of legs modified). Mr. Blake asks whether I "noticed the mandibles attached to the sucker, and also if the legs were still present, as in the nymph stage they are absent." This should evidently read "pupal stage." I did not observe the mandibles and there were no legs visible. Doubtless the "mandibles" were sunk in the substance of the dyticus, and I was unavoidably prevented from removing the pupæ from the beetle. The second order of Arachnida (Trachearia) to which these Hydrachnæ belong, is described in the "Animal Kingdom" as receiving the "air by two spiracles," and probably the circular-shaped dots mentioned by Mr. Blake as placed "on each side, and also on the hinder margin of what I may term the cuirass," were the eyes and spiracles respectively. I did not observe these on the pupæ present on the *Dyticus marginalis*, but I have seen very similar parasites on the water bug (*Ranatra linearis*) but much smaller, being about $\frac{1}{24}$ of an inch long, and drawn to a point at the extremity of the body (those on *D. marginalis* being rounded like a bag), on these small pupæ there were two small dark dots on each side. The small parasites which are evidently pupæ, probably of another species of water mite, were situated (on one specimen) not on the tail of the Ranatra, but on the under side of the body, and on the first pair of legs. Now it has occurred to me that, in the case of the parasites on *D. marginalis* they would from their position on the back of the beetle under the elytra, come in contact with the air stored there by the beetle for its own respiration; but the parasites on Ranatra were placed where they would not come into direct communication either with the air at the surface of the water, or with that breathed by the Ranatra, because that insect only protrudes the tip of its long tail above the surface, its body and legs being constantly immersed. How therefore, do these parasites obtain their supply of air? I see there is a note in the "Animal Kingdom," "that some species of these Arachnida (Tracheariæ) such as the pycnogonidæ, do not exhibit any spiracles, and their mode of respiration is unknown," also "some aquatic larvæ have a very peculiar respiratory apparatus." If these parasites cause the death of their hosts surely they must perish with them. Perhaps some of your correspondents have reared Hydrachnæ from pupæ or larvæ, and may be good enough to communicate the result of their experience.—*Abbot G. Laker.*

Cross between Bullfinch and Canary.—It has been asserted by some breeders of cage birds that the canary and bullfinch when paired together never produce offspring, but a pair of these birds, possessed by Mr. William Yeoman of Thomer near Leeds (one of two pairs which he has now on hand), have this year hatched two birds of the crossed species, the produce of separate broods. The first of these however died soon after being hatched, but the second is this day (August 5th) four weeks old, and is a very fine thriving bird. This is only the fourth bird of the kind which has resulted from pairs kept by Mr. Yeoman for a period of thirty-three years. The first which rewarded his perseverance was hatched in 1870, and gained a first prize at an exhibition of cage-birds held at the Crystal Palace, Sydenham, in February 1871. Since that time he has constantly had two or three pairs of the two species on hand, which have regularly associated and paired, but with no result, except barren eggs, till the present year, and another case which occurred about eight years since, when a brood of eggs produced one very short-lived bird.—*J. W.*

Water Spiders.—In reply to Mr. J. A. Ollard's query in Science-Gossip for August concerning water spiders. I would inform him, presuming he refers to the Hydrachnidæ or water mites, that I long since commenced the study of this interesting little group and collected within the course of two summers in the neighbourhood of London alone upwards of fifty distinct varieties. I am now working at the subject again with the view to a monograph of the British species, and shall hence be indebted to Mr. Ollard or any other subscribers to SCIENCE-GOSSIP for new material or notices of new localities of our indigenous types. For the purpose of study, the water mites, or swimming mites, as they may be more appropriately called, all the species being especially adapted for a natatory existence, through the development on their legs of long swimming hairs, may be conveniently kept in small glass bottles of one and two ounce capacity, a bottle being relegated to each species and a small fragment of water plant such as Ranunculus or Fontinalis, being added for the little animals to rest and deposit their eggs upon. Small entomostraca, daphnias, or cyprids should be provided as food every few days, the water mites, like their congeners the true spiders, being eminently predatory in their habits and requiring a constant supply of living prey. It is highly interesting to observe the way in which many of the water mites halting in their mid career pounce down upon their quarry and bear it off to dinner at leisure, much after the manner in which a hawk secures its prey. A small label should be affixed to each bottle indicating the locality and date of capture, a number being added in lieu of the specific name should this be undetermined, space being left for supplementary notes concerning the date of deposition and hatching of the ova of any subsequent metamorphoses. In addition to their beauty as living objects the water mites will be found admirably adapted for permanent preservation, and when suitably mounted and exhibited with the assistance of the parabolic illuminator, they constitute an important and attractive accession to the collector's cabinet. The adult mites may be killed instantaneously with their legs extended as in life by momentary immersion in scalding water, and should be then mounted in a cell of suitable depth in either camphor water or a weak solution of, say one of spirit to four or five of water. Specimens thus preserved by the writer so long as fourteen years ago still retain their pristine form and brilliancy, the scarlets, browns, greens and yellows, chiefly characteristic of this group, being as bright as on the day on which they were mounted. Both the ova and hexapod larvæ may be preserved in the same simple medium. For working out the more minute details of the mandibles, palpi, and other appendages, examples should be dissected or crushed and mounted in either fluid or balsam.—*W. Saville Kent.*

PROVINCIAL SOCIETIES.—The third part, vol. iii. (new series) of the "Proceedings of the Bristol Naturalists' Society," is to hand, containing some very important papers, out of which we select the following for special notice: "The Age of the Wye," by Chas. Richardson; "Catalogue of the Lepidoptera of the Bristol District," by A. E. Hudd; "Fungi of the Bristol District," by C. Bucknall. The April and May numbers of the "Transactions of the Hertfordshire Natural History Society," contain (besides table of contents, &c.), Reports of the Field Meetings for 1880, and of the Proceedings of the Society, from October 1880 to April 1881. We have received a copy of Mr. F. E. Sawyer's paper (read before the Brighton and Sussex Natural History Society) on "Sussex Fish and Fisheries," giving a detailed catalogue of the fishes found on the coast, history of the fisheries, archæological notes on ditto, folk lore of fishes, &c., altogether a very valuable paper. The Annual Report of the "North Staffordshire Naturalists' Field Club" for 1881 contains accounts of natural history and archæological excursions to various parts of the country, under excellent leadership, and papers by Dr. McAldowie, C. L. Wragge, C. Lynam, R. Garner, F. M. Sexton, and the annual address of the President, Mr. Earl. The "Proceedings of the Liverpool Naturalists' Field Club" for 1881–2 contains the address of the President (the Rev. H. H. Higgens) "Animal adornments," accounts of the excursions (which are always numerous and well attended), and of the evening meetings. The seventy-fourth report of the East Kent Natural History Society contains excellent abstracts of papers by Capt. McDakin, G. H. Nelson, Mr. J. Fullagar, Dr. Boddy, Mr. S. Saunders, &c. The Isle of Man Natural History and Antiquarian Society is now well and soundly established, thanks very largely to its honorary secretary, Mr. P. C. Kermode. The excursions are well reported, and are made to various localities for which this lovely little island is celebrated. A paper was recently read by Mr. Robert Garner, F.L.S., of Stoke-on-Trent, during one of these excursions, in which he suggested that the tailless Manx cat might be considered a rock variety, possibly due to the action of the principle of economy of material.

A RARE BEE.—All entomologists will be glad to hear that Mr. Fred. Enock has been successful in capturing both males and females of the rarest of British bees, viz., *Macropis labiata*. The first (a male) was observed July 27, flying along the banks of the Basingstoke Canal, in the neighbourhood of Woking Station, and on the 29th, in exactly the same spot, four males were caught flying very rapidly. The next one to appear was a lovely female, this as quickly disappeared into Mr. Enock's net. We find the following remarks respecting *Macropis labiata* in Mr. Fred. Smith's "Bees of Great Britain." "Of this rare insect only three British collections possess specimens, and these are all males; that in the British Museum was probably the first captured in this country, and was taken by Dr. Leach. The second was met with by Mr. T. Walton, in the New Forest; and Mr. Samuel Stevens captured a third at Weybridge, July 4th, 1842. The species is no doubt very rare, not only the precise spot where Mr. Stevens took it, but also the surrounding country has been searched every season since its capture, without its being again met with." Since the above work was published, Macropis has been taken by Mr. Bridgman in the neighbourhood of Norwich.

"THE BUTTERFLIES OF EUROPE," by H. C. Lang, M.D., F.L.S. (London: L. Reeve & Co.) Part ix. of this excellent work is issued. Both text and illustrations are fully up to the high standard we have had to commend in previous parts.

BOTANY.

BEGONIA AND BIGNONIA.—Being shown a fine begonia the other day, and asked whether the plant had any resemblance to a bignonia, I was amused at the ignorance of botany displayed in the question, but it afterwards occurred to me that some of your readers might be interested in the origin of the names of these two families of plants. The begoniaceæ are now well known to be related to the cucurbital or gourd tribe. The begonia, from which genus the order takes its name, was first described by Charles Plumier, a French botanist, who, pursuing his investigations at St. Domingo, whilst M. Bégon was governor (1683-1685) of the French West India Islands under Louis XIV. and receiving much patronage and kindness from him, gave his new genus of plants the name Begonia. The proper collocation of the order has given much trouble to botanists, and the recent discovery of a new genus in the Sandwich Islands shows that it has an affinity with the saxifrageæ, as was pointed out by Professor Oliver. But its unisexual flowers will merely keep it in the cucurbital alliance. The beautiful trumpet-shaped flowers of the bignonia "are the glory," says Lindley, "of the places which the species inhabit." They are found between the tropics in both hemispheres, and in America extend from Pennsylvania to Chili. The name was given by the great French botanist Tournefort, in honour of the Abbé Jean Paul Bignon, who was made king's librarian to Louis XV. in 1718, and died in 1743 The only resemblance (if it may be called so) of the bignoniaceæ to the begoniaceæ is that no species of either is native in Europe. Allied orders are the acanthaceæ and the widely diffused scrophulariaceæ, the commonest genus of which, the humble but beautiful veronica, we seldom fail to see "whene'er we take our walks abroad" in the country. But the bignonia is sometimes found forming large trees in the forests of Brazil. *W. T. Lynn.*

MALFORMATION OF A FUCHSIA.—Passing through a friend's greenhouse the other day, my attention was called to a curious fuchsia. The flower was solitary and axillary, and from the peduncle, which was unusually long and stout, a perfectly formed green leaf was growing. The calyx tube was very short, and the four segments of the limb spread from different points. One of the segments was almost entirely converted into a leaf. The leaf part was broad, serrated, deeply veined, and very much puckered, while the other edge was narrow, smooth, and coloured like the ordinary segments.—*E. C. R. Langley, Bow Brickhill, Fenny Stratford.*

LEUCOBRYUM GLAUCUM, VAR. MINUS.—During a visit to the New Forest, by Mr. B. Piffard, in the spring of the present year, that gentleman obtained gatherings of mosses, although the primary object of his visit was entomological. Subsequently duplicates of these mosses were sent to me, and amongst others was one that particularly arrested my attention. Being unable to determine it, this with others was sent to Mr. Boswell for identification. A reply was immediately returned, and the specimen in question was named, *L. glaucum* var. minus; my correspondent remarking that he had sought for it in vain in the New Forest, and would like to know the exact locality in which it was discovered. Eventually Dr. Braithwaite had a specimen submitted to him, and that gentleman remarked that he did not know of it as a European plant, but only as occurring in North America. He moreover suggested that, as I purposed to visit the New Forest, the subject should be then investigated. Accordingly, when staying at Brockenhurst for a few days in July, the station described to me by Mr. Piffard was visited, and after a careful search, the moss was observed in the locality where first discovered. It occurs in small circular or oblong tufts, from an inch to four or five in diameter, with elevated centres, and of a bright glaucous-green hue. The height of the plants varies from half an inch to an inch, and it is altogether a much more diminutive plant than the usual type. The latter grows in great profusion in the forest, and tufts may be seen eight or nine inches in depth, in favourable situations. The variety now referred to grows chiefly at the roots of beech trees, rarely oak, on elevated spots, with a sandy subsoil. As I write this there are lying before me several tufts of the moss, dried as in nature, and they have taken so kindly to the process that they appear just as they did, when, like fairy velvet cushions, they clustered round the protruding roots of the grand old forest beeches. Thinking that probably other specimens would occur in similar localities in the neighbourhood, I revisited the place and spent many hours in careful examination of every likely spot. The result was gratifying, for it was found to occur in unlimited quantities in some half a dozen places near Lyndhurst and Brockenhurst, and in one spot near Holmsley. In addition to this, one very small tuft was found in a bog near Lyndhurst, which I think is the same variety as the subject of the present note, and forms an interesting addition to the New Forest moss flora. I believe it is the intention of Dr. Braithwaite to describe it fully in one of the forthcoming numbers of his work on mosses.—*J. Saunders, Luton.*

SPIRANTHES ÆSTIVALIS.—It may interest the readers of SCIENCE-GOSSIP to know that the above-named plant has occurred in very limited quantities this summer in the station given in the New Forest guide book. Scarcely a dozen plants were observed, but not a single tuber was taken, nor all the flower spikes. It was an agreeable surprise to find it, for it did not grow there last year, as the writer searched the bog carefully for hours, covering every square yard, and could not have avoided seeing so conspicuous a plant if it had been there. Moreover, a labouring man living near had searched unsuccessfully for it, being stimulated by the offer of 1*s.* 6*d.* a root. The letter containing the request for them was shown me, and it was in a lady's handwriting. Surely this is one of the most effectual means of exterminating a rarity, especially as the man had succeeded the previous year (1880) in securing nearly a dozen plants. It is some satisfaction, however, to know that there are at least ten tubers left in the bog, at the present time. It is still more gratifying to learn from an article by Mr. Marquand, in SCIENCE-GOSSIP 1879, that it occurs plentifully in another bog in the New Forest, the name of which he rightly reserves. Knowing this, myself and a friend carefully searched every bog that we met with, but did not find it again. We were, however, amply repaid for some thirty hours' bare-footed bog-trotting when once their delicate spikes met our view.—*J. Saunders, Luton.*

DISPERSION OF SEEDS.—It is remarkable what design is shown in the arrangements in various plants for dispersion of their seeds; an instance of which brought itself forcibly to my notice one day recently in the case of *Geranium sylvaticum.* In this plant the seeds are cast long distances by the sudden recurving upwards (as of a strong spring suddenly let loose), of the style segments attached to each vessel bearing one seed. Struck by seeing the seeds thus cast off, I tried several portions of a plant, detaching branches and testing them on a level surface by laying large sheets of paper in front, and then slightly easing the tension of a style segment attached to a seed vessel, being careful to impart no appreciable thrust forward. The result of several experiments gave ten feet six inches as the greatest measured distance a seed was cast off; though, as a few seeds were thrown sideways, some may have exceeded this space. Now to bring about this result, we have—the gradual loosening of each seed in its vessel: the long-continued adhesion of parts of the style all round, just above the seeds: the strong recurving power of each segment into which the style becomes split up: and all combining so that just at the right stage of ripeness the seeds are cast such long distances. On a mountain side, as on Helvellyn, where last year I found many of these beautiful plants fringing a stream pouring down to Thirlmere, they may sometimes be thrown considerably farther, in a favourable wind especially. I would call attention also to the beautiful form of this and other Gerania, when all seeds are ejected; the curves of style segments, still attached to the seed vessels being exquisitely proportioned, and combining to form a design well adapted for copying, for architectural or domestic purposes.—*Horace Pearce, F.L.S., Stourbridge.*

LADIES' TRACES.—My statement that "ladies' traces" is a corruption of ladies' tresses, is in accordance with the views of Withering, Babington and others. Mr. Meehan is mistaken in supposing that tresses mean wavy or curly hair only. The Latin equivalent is *cincinnus cirri*, "Cirri inter se decussatim implexi"—hair plaited in tresses. The French *tresse* (from which our word is derived) means a braid or plait—and one of the meanings of the verb *tresser* is to braid or plait hair. The Spanish *trenza* also means a braid of hair. The German *haarlocke*, the equivalent of tress, means a lock of hair. Will Mr. Meehan give his authority for the statement that "ladies' traces" were the cords used in olden time for drawing ladies' dresses together? I am unable to find any account of them.—*F. K.*

GEOLOGY.

ERRATICS IN GLACIAL DEPOSITS.—Professor James Geikie continues his valuable paper on the "Intercrossing of Erratics in Glacial Deposits," in the last number of the "Scottish Naturalist."

THE GEOLOGISTS' ASSOCIATION.—The last number of the Proceedings of this society contained (besides notices of the ordinary meetings, &c.) two valuable papers on "Some Recent Researches among Lower Palæozoic Rocks in the British Isles," by Dr. Henry Hicks, and the other on "Lakes and their Origin," by Professor Martin Duncan. In the latter paper the relative age and origin of lakes is studied from their zoological contents.

WHAT IS JET?—A paragraph in the last number of SCIENCE-GOSSIP, with respect to the origin of jet, set me looking through a variety of scientific works and periodicals, but with very little result. The subject does not seem to have received very much attention. In the volume of SCIENCE-GOSSIP for 1871, I found the only article of any length relative to jet, which I have yet come across; but in this the writer speaks of it as a kind of resin, pitch, or gum, a description which does not at all commend itself to my mind. It appears to me that the brief notice given in a much older work, "The Penny Cyclopædia," is more in accordance with fact. Therein I read: "Jet, a variety of coal, which occurs sometimes in elongated reniform masses, and sometimes in the form of branches, with a woody structure." On the table before me I have a section of jet, prepared by Mr. Wheeler; viewed under a low power of the microscope, its "woody structure" is unmistakeable.—*J. Ford, Wolverhampton.*

ORIGIN OF JET.—This substance is considered as a species of amber, and most probably had its origin from the exudation of some tree, as no doubt it is derived from vegetable matter. In Prussia it is generally known by the name of "Black Amber." It occurs in nodules and lumps, in lignitic strata, and is found in great purity and abundance in the cliffs of alum shale on the coast of Yorkshire, where the well-known jet manufactories of Whitby and Scarborough are situated. Like amber it is electric when rubbed; is more resinous in lustre than the finest cannel coal, and is also specifically lighter. There is little about its appearance to the naked eye to indicate that it is a fossil wood, as it does not show a woody texture like lignite, but it is uniform like asphalt. Its intense velvety black well adapts it for the numerous ornaments into which it is manufactured.—*Dipton Burn.*

COAL MEASURE FOSSILS.—A few days ago I had the pleasure of spending a few hours in examining the valuable collection of coal measure fossils gathered by Mr. J. Sims, a working miner at West Cramlington, Northumberland, and among the many specimens in his collection gathered from the Low Main Coal Shale, I saw a group of fragments of shale which he had obtained from a then unworked seam of coal which lies a few feet from the Low Main, and was passed through in driving a drift through a fault, from Low Main to Low Main. The shale is hard and black, and the fragments of coal upon it are hard and shining. This shale is very rich in fossil remains, in fact it is crowded, and on the few specimens I examined I found the characteristically tipped teeth of Pygopterus, spines of Acanthodopsis; scales and head bones of Cœlacanthus, scales of Rhizodopsis, teeth and scales of Megalichthys, lanceolate tooth of Loxomma, teeth of Diplodus, teeth of Helodus; these I found during a most cursory examination, and the only regret I felt was that more of the shale had not been obtained, as it is now finally buried from view. I also found a large tooth resembling Helodus and Psammodus in external markings, but not in form, and when I identify the tooth, I propose to forward particulars for insertion in SCIENCE-GOSSIP.—*T. P. Barkas, Newcastle-on-Tyne.*

NOTES AND QUERIES.

WHITE HEATHER, &c.—As there have been notices on the white heather in several of the last numbers of the "GOSSIP," commencing in December, 1881, I have been expecting that some correspondent from the neighbourhood of Manchester would have noticed the subject. As none such has appeared, with your permission, I purpose making a few remarks myself. In answer to your correspondent in the December number, I may say that the common ling (*Calluna vulgaris*), with white flowers, was very plentiful on Lindon Common, near Wilmslow, twenty years back. I have frequently gathered it, with white flowers, on the racecourse near the old workhouse; but now it has almost disappeared. I, however, gathered a few branches of it, near the Black Lake on the racecourse, in the year 1880. I think with W. Macgillivray that this white-flowered ling is a distinct variety. I may say here that in July, 1880, I visited this common, and I found cross-leaved heath (*Erica tetralix*), with white flowers, in several places near the Row-of-Trees, on the same common. On this occasion I entered on the common at the Row-of-Trees, before mentioned, and crossed to the Paddock-hill side, and, when not far upon the common, I found those two pretty plants *Drosera rotundifolia* and *longifolia* very near together; and I also found another pretty plant, *Andromeda polifolia* (bog rosemary), with flowers varying from purple to near pure white, in abundance. I also gathered bog asphodel (*Narthecium ossifragum*) in profusion; and, in a ditch near a small farm-house, near the edge of the common, I gathered the common skull-cap (*Scutellaria galericulata*). From the Paddock-hill side of the common I made for the Rifle Battery, and on to Newgate and Morley Green, crossing the common in this direction; and on this route I gathered the sun-dew (*Drosera anglica*), so that I gathered the three varieties of sun-dew that day. I am, however, afraid that it will soon disappear, for, as the common is cultivated, those parts become scarce, and eventually die out. My object in mentioning these plants is for the information of my botanical friends in the neighbourhood of Manchester, who may not have been on this common, or not on the southern side of it. I may say that on the lower level—that part from which the turf has been cut—on the Morley side, I found a few young plants of the Osmunda, very small ones. A few years back I have found this plant 7 feet high on the Mobberley side of this common, but the fern-gatherers find them and take them away, so that now this plant is getting very scarce indeed here. In returning to Wilmslow I gathered the wall-rue (*Asplenium ruta-muraria*) on the garden-wall of the old workhouse; and it also grows upon the old garden-wall up the foot-road behind the Hawthorn Hall.—*John Slater.*

POND LIFE.—I can endorse the remarks of E. T. D. in the April number of SCIENCE-GOSSIP, as to the spring months being the best time for starting a new, or inoculating an old tank for microscopic observations. As during Eastertide, whilst on my rambles, I procured, from a seemingly undisturbed pond, a sufficient quantity of the sediment to cover the bottom of a moderate-sized glass vessel to the depth of about one inch, also bringing a bottle containing water from the same pond, together with some of the water-weeds; and having placed these within the glass, I afterwards added sufficient rain-water to complete my extemporised micro-tank. Having stood the above in a moderately light and cool place for about one week, I took a dipping tube and made several examinations, but found very few specimens of active animal life. I have kept adding small quantities of rain-water from time to time, to compensate for loss by evaporation, and at the end of April, on taking down the glass and holding it to the light, I beheld an immense quantity of minute specks of animal life flitting hither and thither in all directions. I found upon closer examination that *Cyclops quadricornis* was present in all stages of development; I also dipped out successively *Daphnia pulex* and the globose water-flea, *Chydorus sphæricus*, likewise the ribbed water-flea "*Camptocercus*" *macroura*, and I have since discovered the Pitcher rotifer or *Brachionus*, and have no doubt that deeper investigation will reveal other forms. I feel convinced that as the summer advances, and by paying proper attention, I shall be in possession of a rich fund of intellectual amusement, such as I could not expect to meet with by ordinary collecting.—*F. Farrant, Brighton.*

WHOLESALE DESTRUCTION OF YOUNG ROOKS.—The storm which raged so furiously on the 29th April soon after mid-day was most fatal to the young rooks in this district; some trees have been blown down, many nests carried some distance with the force of the wind, and hundreds of young rooks destroyed. At Bosrigo after the storm, which lasted nearly three hours, boys were picking the young rooks up a dozen at a time; the large rookery at Tregolles fared no better, many nests being gone, and the ground strewed with the young; the trees being high, they were mostly killed probably by the fall. In Simon-street and Edward-street, where rooks had built, there were the same results in a lesser degree. On the following day, I visited a rookery about two miles from the city in a clump of trees beyond Tenair, and near Penealcuick grounds; quantities of young were lying dead, many nests about and two trees down; some of the young could not have been hatched more than a few days, others again were all but fully fledged; the season being so mild, they commenced building earlier than usual this year. In Edward-street some of the young that were alive were taken into shelter for the night, and when placed under the trees the following morning the old ones came and fed them.—*Hamilton James, Truro.*

LAPWINGS' EGGS.—There are one or two peculiarities in the eggs of the lapwing, which I have never seen mentioned in any journal, and which seem to me worthy of note. It has often struck me as curious, that in the same field, in nests quite close together, eggs are sometimes found quite different in colour and shape. For instance, on one occasion I found in one nest four eggs round and "dumpy," brown in colour, and so thickly sprinkled with black blotches that the ground colour at one end was almost hidden; while, within a hundred feet of these I found another nest containing four eggs long and pointed in shape and of a creamy green colour, comparatively thinly sprinkled with black. The field was marshy meadow, and the eggs in each case were equally fresh. What could cause the difference? Another curious matter has come to my notice. I have several times found and seen others find lapwings' eggs not larger than those of a sparrow, but on one occasion, when walking over a moor in Scotland, I found a nest containing three eggs, one long and pointed, light in colour, one short and round, dark in colour, and one of the small description just mentioned. I never heard of the same strange variation in the eggs from one nest, and I venture to send you this in the hope that (if you insert it) some of your readers may perhaps be able to explain it.—*G. R.*

SWALLOWS' NESTS.—In this immediate locality a pair of chimney swallows built under a bridge for several years past, over which there is not only constant traffic, but which, owing to its being constructed mainly of wood, vibrates considerably with every load that passes; unfortunately, both in 1880 and 1881, the nests were destroyed by boys. Whilst standing on this bridge the birds will shoot under within a yard of my feet, uttering plaintive cries the while; whether they will try the experiment again this season remains to be seen.—*E. Lingwood, Stonham, Suffolk.*

PECULIAR SITE FOR A BLUE TIT'S NEST.—In the spring of 1878, while egg collecting with the gamekeeper's son, in Mabledon Park, Tunbridge, I was climbing up to a thrush's nest in a large hawthorn-tree standing by itself. The keeper noticing what I was doing told me that it was an old one, and he had been up to it some days before. As I had just reached the nest I felt in it and to my surprise in a little hay at the bottom, not covered in the least, I found two tomtits' eggs, these I blew and added to my collection, but they have unfortunately got broken. Some days after, a party of naturalists were collecting in quite a different part of Tunbridge, when they too found a thrush's nest with, I think, three eggs in; the nest was an old one and was placed in a thorn hedge. Perhaps an instance of the same kind may have come under the notice of some of your readers.—*B. Row, Blackheath.*

TERNS INLAND.—On the 20th of May, the wind was rather high, and the water in a broad reach of the river, about half a mile above the town, was very rough. As I was sculling up the river, I saw three Terns (either common or Arctic, the former I suspect), wheeling above the surface of the water, and as I watched their rapid buoyant flight, and quick turns and wheeling, I was reminded of their "nickname" sea swallow; and well have they earned it. I never before heard of tern being seen so far inland as this. They caused great excitement, and many were the names applied to them, ranging from "stormy petrel" to "herring gull," and "kittiwake" and much was the ignorance of sea birds that was shown. There was no storm, either before or after their appearance, to account for their visit: they left an hour or two after I first saw them.—*G. T. B., Oxford.*

MISCELLANEOUS NOTES.—I was reading in SCIENCE-GOSSIP a short time ago about the scarcity of wasps. On Sunday, the 5th of March, I observed in our church a wasp buzzing on the window; also I found a dead one on the floor of the pew; were they not very early? Our church is a very ancient one, and has just been restored; it is partly built out of the stones of the Roman wall, which are known by a peculiar mark of lines crossing each other. The tower of the church, which is the most interesting part, is entered by a massive iron gate, and the walls are of immense thickness. This tower was a place of defence in the invasions of the Scots; the inhabitants of the village drove the cattle into the body of the church, while they themselves took refuge in the tower. There are some other similar churches on the border. I should like to know if the plant Herb Paris (*Paris quadrifolia*) is common in the south. I have seen it here in Cumberland.—*A. Maud D., Burgh House, Burgh-by-Sands, Cumberland.*

EARTHWORMS.—I think W. H. Brachett would best lessen the quantity of earthworms in his garden by, if possible, inducing birds to frequent it. If that cannot be done, he would find a hedge-hog very useful; it would live for a length of time if there was a dry place for it to sleep in, and, as hedgehogs are out chiefly at night they make great havoc amongst the worms and slugs, and do not destroy the flowers. We had one in the garden for two years; it used to make a bed of dried leaves in a dry spot, and hybernate through the winter. I believe land-tortoises devour earthworms, but they are difficult to keep through the winter.—*A. B. Plant.*

LATE TADPOLES.—In reply to your correspondent G. R. R., I beg to say that I have a tiny frog (English) that I took just as it emerged from the tadpole state. I have now had it in confinement about three weeks. It grows very slowly, but is active and plump. I have it in a large aquarium glass with a number of tree-frogs that I have kept about a year. When I feed them with flies I also drop in some very minute flies and insects that I sweep off the ivy, grass, and ferns with a net. The little English fellow is very active in catching them, and his ambition one day led him to attack a bluebottle; he caught the wing, but of course the fly instantly escaped without injury. He is very amusing to watch, often lying spread out on the water for a long time together, and I have seen him up on the branches *vis-à-vis* with his green companions, who are perfect giants compared with him, but seem on friendly terms.—*J. Fitz Gerald.*

CLIMBING POWERS OF EARTHWORMS.—Last evening, after some hours of rain, I observed on the upper part of my study window, outside, what looked at first sight like a leafless twig, about three inches long, stuck on the glass. Looking, however, at it more closely, the pointed head of an earthworm was soon protruded at one end, and it proceeded, with great slowness and caution, to wriggle a tortuous course upwards on the vertical plate glass, till, darkness coming on, I lost sight of it. Apparently it must have managed to climb a height of at least seven feet before getting on the glass; but whether the climbing was on the brickwork, or in the angle of the window-frame, I cannot say. At any rate, there it was peacefully progressing over the glass, which I tapped close to it, to test its adherent capacity; but the glass being so thick, the jarring was not sufficient to make it fall. On first seeing it move, I thought it could not be an earthworm, but closer inspection proved that it undoubtedly was. I have not seen Darwin's work on worms, and am therefore ignorant of anything he may have observed on the subject; but the fact is certainly new to me, and possibly to many of your readers.—*E. Buckland Kemp Welch, Bournemouth.*

YOUNG FROGS.—In the July number of SCIENCE-GOSSIP, G. R. R. stated that he had been unable to keep young frogs for more than eight days after they had left the tadpole stage. Allow me to mention that I kept one for three weeks, feeding it on small flies and insects. It died at the end of this period, however, having hardly grown at all since it left the tadpole stage.—*A. H. Fisher.*

LAND AND FRESH-WATER SHELLS.—Will some of your readers of SCIENCE-GOSSIP inform me if the following species of land and fresh-water shells have recently been found, or if they may be considered as [illegible]? A list supplied to me recently mentions as British, *Helix aperta, H. villosa* (Drap.), some specimens said to have been procured near Cardiff, 1873. "Annals and Magazine of Nat. Hist. 1877." Also *Clausilia parvula* (Studor), and *Clausilia solida* (Drap.).—*A. Loydell.*

TRICHINÆ.—In the June number of SCIENCE-GOSSIP, M. E., Upton House, says, "he has read that it is believed pigs get trichinæ from rats," and inquires "how does this come to pass?" The "belief" is new to me, but is not altogether improbable. I remember some years ago, being at a farm-house, when a rat-catcher came with dogs and ferrets and tried his skill in exterminating these pests of the farm. The scene of his operations was a large barn, and from beneath the floor and from holes in the walls a considerable number of vermin were caught. When the work was done, the rats, which were of all sizes and ages, were laid on the top of a low wall to be seen and counted by the steward who paid the rat-catcher so much per head. Turning to the steward, I said, "and what will you do with all these dead rats?" "Oh!" he replied, "give them to the hogs," and sure enough they were thrown into an enclosure containing about twenty pigs, who immediately and with evident relish devoured their filthy meal. How far such a custom is common, I am unable to say; it was no unusual thing with this person, and if it is an ordinary thing for farmers to do, it easily accounts for the "belief" to which M. E refers.—*T. S. King, Sheffield.*

TALC.—Will any reader of SCIENCE-GOSSIP tell me if Talc is used in microscopy, and if so, what is it used for?—*L. Francis, Abergavenny.*

HELIX CANTIANA.—During my conchological rambles, I, to my own surprise, stumbled across a herd of *Helix cantiana* feeding on the short grass on the banks of the Tees near Billingham. I have not observed this locality recorded, and therefore take the opportunity of giving it to you to deal with. They appear to have been found near Newcastle-on-Tyne, where they were introduced with ballast, and possibly this may have been the case with those found by myself. However they, together with *H. aspersa*, are in great plenty at the place I name.—*Baker Hudson.*

A SUGGESTION.—As tending still further to enhance the value of SCIENCE-GOSSIP, might I suggest the insertion of references to books and papers on special subjects which come under the notice of correspondents? The following will illustrate what I mean:—*Musical Fishes.* (SCIENCE-GOSSIP, 1870, pp. 57, 87, 95, 97, 146); Mitchell, Trans. Lit. and Phil. Soc. N. Y. v. 1, p. 411; "Bombay Times," Jan. and Feb. 13, 1847; "Nature," vol. ii. pp. 25, 46, 356; vol. iv. p. 26; "Field" newspaper, Oct. 26 and Nov. 23, 1867; Günther, "Study of Fishes," p. 420, Tennent's "Ceylon," vol. ii.; Tennent's "Sketches of the Nat. Hist. of Ceylon," p. 383; Cuvier's "Fishes," vol. x. p. 504.—*J. A. Westwood Oliver.*

SUFFOLK NAMES.—I do not know whether the following have appeared in print before, but at least they will do no harm by doing so again. "Spink" (chaffinch); "slight" (swallow); "billy-wix" (owl); "pudding-poke" (long-tailed tit); "harnsa," (heron); "barley-bird" (nightingale); "tomtit" (common tit); "oaf" (some kind of finch); "bud-doaf" or "bloodoaf" (bull-finch); "pincushions" (corn-cockles); "drawk" (darnel); "head-ache" (wild-poppy); "brakes" (brachen); "nip" (cat-mint); "gottridge" (gelder-rose); "guys" (corn-weeds, poppies, &c.); "sinsion" (groundsel); "locks" (sedge and rushes); "lords and ladies"

(*Arum maculatum*); "masslinn" (mistletoe); "plum-puddings" (campion); "dodman" (snail); "dor" (cockchafer); "pinpatch" (periwinkle); "tan-tittles" "stickers" (stickleback); "swift" (newt); "pollywog" (tadpole); "ranny" (field-mouse); "arywiggle" (earwig); and "brock" (badger). "Harnsa." for heron, recalls "Hamlet," act ii. scene 2; "I know a hawk from a handsaw." Give "handsaw" a twist of the Suffolk tongue, and one has "harnsa," a heron, making the passage easily understood.—*P. S. Taylor.*

LOCAL NAMES.—(Suffolk.) Common heron (*Arda cinerea*) harnser; common fieldfare (*Turdus iliaris*) dowfelfeet; common thrush (*Turdus musicus*) mavish; wryneck (*Yunx torquilla*) barleybird; common whitethroat (*Curruca cinerea*) hay-jack; chaffinch (*Fringilla cœlebs*) spink; goldfinch (*Carduelis elegans*) King Harry; blue tit (*Parus cæruleus*) pickcheese; chiff-chaff (*Sylvia hippolais*) and willow-warbler (*Sylvia trochilus*) obenbirds; long-tailed tit (*Parus caudatus*) pudding-poke; common wren (*Troglodytes vulgaris*) titereen; common gull (*Larus canus*) seacrow. Our rural lads and lasses are now educated so liberally that the above local names must soon become things of the past.—*E. Lingwood, Stonham, Suffolk.*

SETTING LEPIDOPTERA.—Individually I should not be much predisposed as regards the use of shellac, glue and gum tragacanth, to obviate the spring of the wings in resetting desiccated lepidoptera, as thereby at the very least the specimens would be in measure deteriorated from a biological stand-point, and though otherwise avowedly the pink of perfection they might prove of less service when their structure had to be considered. Better seems to me the plan of submitting the awkward examples to a good soaking by allowing them to float on the surface of a cup of water for a day or two and so to fairly emasculate the muscular system before applying the braces. Many a refractory old Indian I have lately got the advantage of, and finally fairly overcome, by this method, and it has occurred to me that if the water had been previously heated surer results might have been anticipated. Then a word as regards the setting of lepidoptera and other insects. I do not know whether it is known generally that peat as sold for firing makes a very good substitute for cork and might be rendered very serviceable for entomological purposes. Apart from the outstanding drawback of heather roots and a slight variation in texture, it is tough and even in measure elastic, holding the pin well, its soft fibre also taking the prick of the smaller sizes in use without breaking or bending them. I should have been inclined to say that the only obvious drawback to the employment of peat would lie in its weight, did it not at the moment strike me that German dealers are actually in the habit of placing some soft compound of similar nature at the bottom of their post boxes. As regards extemporising setting boards, the case in point, it will be found perfectly invaluable from the facility with which it may be cut and trimmed with a knife, it slices and cuts quite like a turnip; four strokes make a plane for the wings and groove for the body, and there remains but to pin the object of admiration and display its perfections. Travellers and schoolboys, whose fortunate shilling has been expended on sweets and cakes, might any way seize the idea.—*A. H. Swinton, Binfield House, Waterdon Road, Guildford.*

EYESTONES.—The eyestones which are occasionally met with in the chemists' shops are found on the beach of Cape Araza and exported. They are the opercula of certain species of small univalve shells. If you place one on a smooth plate in lemon juice you will find it, I am told, move about, for the evolution of carbonic acid gas, from the carbonate of lime of which it is composed lifts it up, as if it were alive. The natives of Venezuela call these stones "*Peidras de los ojos.*"—*Helen E. Watney.*

VINE PEST.—Last October, I made an inquiry in your columns (1881, p. 234) as to a vine pest described by White in his "Nat. Hist. of Selborne." To abbreviate as much as possible, I gave, in lieu of descriptions, the Latin name as given by White, "*Coccus vitis viniferæ* (Linn.)," and perhaps this may explain the fact that I got no answer. May I now repeat this query? I am not enabled to enclose a specimen of this insect, to get my identification confirmed.—*C. Fred Worters.*

FROGS CLIMBING.—On the 5th inst., on coming home in the evening, I was told that there were five frogs climbing up one of the cellar windows. Going downstairs I found two young frogs clinging to a pane of glass, being about halfway up it, and stretched out at full length. The others were on the window-sill. There was a layer of leaves, and some water in the space between the glass and the cellar wall. During the afternoon we had had a severe thunderstorm. Is there any connection between the position of the frogs and the thunderstorm? Supposing the frogs were charged with electricity, did they go on to the glass to become insulated? Did they know that they would probably be more comfortable on the glass? Have any of your correspondents ever noticed frogs in a similar situation?—*W. Arnold Linnell.*

BIRDS' EGGS.—Surely your correspondent X. Y. Z. must be labouring under the disadvantage of a paucity of observations, when he endeavours to throw doubt on the belief that a bird will forsake if all its eggs are taken, but not if one or two are left. I have always found this to be the case in the various parts of Yorkshire in which I have lived, and have verified it by large numbers of experiments. In the case of a hedge sparrow, I once succeeded in taking eleven eggs from one nest, by abstracting them as they were laid, taking care to leave one in, each time. This must be done, however, before the bird has commenced sitting, or it will then probably forsake, or at best continue sitting, without laying any more. There is a belief amongst schoolboys here, that it is possible to "lay a hedge sparrow to death," by continually taking its eggs, but of course it is only a belief. On the other hand, I never yet knew a case, except one, in which a bird continued laying after all the eggs were taken. That exception was a jackdaw, the nest of which was in a hollow tree, and which was remarkable from the fact that it consisted of merely a thin layer of wool, instead of the usual heterogeneous collection of sticks, rubbish, &c. It had four eggs when I found it. Next day it contained none, some one evidently having taken them. On visiting it a week after I found four eggs again. Whether they were laid by the same pair of birds, or not, I am unable to say. Blackbirds, thrushes, yellowhammers, black headed buntings, sparrowhawks, and a host of others, will not forsake, if one or two eggs are left in the nest. I fail to see that there is any need of a law to protect birds' eggs from being taken. The persons whom X. Y. Z. specially wishes to stop from this practice, viz. the country urchins, would be the last to be caught, and, moreover, would not be restrained from fear of correction, as they would live in happy ignorance of the law, just as they do now with regard to the "Small Birds' Protection Act."—*J. A. Wheldon.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

M. Thompson.—Your specimen is *Lastrea recurva*.

J. W. Richford (Wells, Norfolk).—Many thanks for your truly magnificent bouquet of marine flowering plants. One is the sea lavender (*Statice limonium*), and the other the sea wormwood (*Artemisia maritima*).

Thomas Boyle.—Your crustacean is the squat lobster (*Galathea strigosa*). See notes on "Preserving Crustaceans," by Mr. E. Lovett, in Science-Gossip vol. for 1880.

E. C. Thompson (Tunbridge).—White varieties of *Lamium purpureum* are not uncommon in most localities. We believe that the tendency to produce white varieties on the part of very common plants is in order to avail themselves of the fertilising agency of moths in the evening, when such a change of ordinary colour would be most serviceable.

J. Saunders (Luton).—Accept our best thanks for specimens of *Leucobryum glaucum* (and varieties), as well as of *Malaxis paludosa* from Brockenhurst.

F. R. Cowley.—"La Science pour Tous," "Cosmos: les Mondes," "Feuille des Jeunes Naturalistes," "Le Monde de la Science," are all cheap popular French scientific journals, excellently edited, which would suit your wishes admirably. "Cosmos: les Mondes" is a weekly magazine. There would be no difficulty in getting them through Mr. C. Collins, 157 Great Portland Street.

H. C. Ovey.—You will find an article by J. E. Taylor describing a Derbyshire cavern in the August number of Science-Gossip for 1879. The paper entitled "A Lady's Visit to a Derbyshire Cavern" appeared in Science-Gossip for March 188[illegible]. Each part is 4*d*.

C. H. G.—Your rose-leaf is an illustration of what Dr. Masters, in his valuable work on "Vegetable Teratology," terms *pleiophylly*, or "leaf-excess," a small supernumerary leaf shooting from the mid-rib of the ordinary leaf.

J. Rasor.—The specimen is very curious.—We will answer your query in our next issue.

W. M. C. C.—The insects mentioned (p. 189) are not bees, but the hawthorn saw-fly (*Trichiosoma lucorum*), the larvæ of which may now be found upon most hedges; but as they feed at night, they often escape notice, and the cocoons are most frequently seen in the winter months.—*Fred. Enoch.*

EXCHANGES.

A collection of about 180 plants, neatly mounted, for British coleoptera.—C. H. Goodman, Lesness Heath, Kent.

Offered, L. C., 7th ed., 25, 74, 89, 130c, 146, 180, 235, 255, [illegible], 346, 476, 681, 658, 693, 940, 941 b, 1004, 1006, 1056, 1067, [illegible], 1494, 1503, 1578, 1615, and many others, in exchange for other rare plants.—Send lists to A. E. Lomax, 56 Vauxhall Road, Liverpool.

Wanted, gatherings of desmids; especially Euastrum, Cosmarium, Staurastrum, Desmidium, and Didymoprium. Valuable botanical slides in exchange.—C. V. Smith, Carmarthen.

Hair of ourang-outang, black rat (*Mus rattus*), black leopard, white variety of mole, unmounted, for slide of named and mounted diatoms.—Geo. E. Mason, 6 Park Lane, Piccadilly, London.

A good supply of East Anglian and Highland plants offered in exchange for other rare plants. Send lists.—Rev. E. F. [illegible]ton, Sprowston Vicarage, Norwich.

[illegible] mole and stuffed coronella for live bat, mole, shrew, [illegible], harvest-mouse, or stuffed bat, stoat, weasel, or shrew. H. C. Brooke, 45 Union Grove, Wandsworth Road, S.W.

[illegible] duplicates. Wanted, Sibylla, Machaon, polychloros, [illegible] G. F. Brabon, 4? Shakespere Road, South Hornsey, N.

Wanted, British land and freshwater shells (rare), also varieties; exchange. Have first volume of "Universal Instructor," unbound; exchange shells.—Helix, 5 Station Road, Redcar.

Fluke or head of tapeworm wanted, mounted. Will give mounted crystals, very beautiful.—A. Smith, The Laboratory, Essex Road, London.

Wanted, Lyell's "Principles of Geology" and Darwin's "Origin of Species." Will offer in exchange British land and freshwater shells, or collection of foreign coins.—J. Rewcastle, 16 Hill Grove Hill, Stokes Croft, Bristol.

Wanted, the January number of "The Zoologist" for this year. Exchange.—Henry H. Slater, Chersley Vicarage, Aylesbury.

Offered, "The Doré Gallery," complete in 50 parts, containing 250 beautiful engravings, cost £5. Wanted, Saville Kent's "Manual of the Infusoria," in 3 vols., price £4 4*s*.—J. Smith, Stobs, Kilwinning.

Wanted, Entomology: vanessa, *C. album*, polychloros, antiopa, in exchange. Send lists.—A. C. O., 76 Trafalgar Road, Old Kent Road, S.E.

For well-mounted slides will exchange pig parasite, *Hæmatopinus suis* and others. Send list.—J. E. Fawcett, Rawdon, Leeds.

Phyteuma orbiculare and *Orobanche minor* in exchange for other plants. Wanted, Nos. 136, 138, 139, 140, and 165.—J. H. Bloom, Westbury House, Worthing.

Duplicates: Caprini and pupæ, *B. quercus* and pupæ. Desiderata: Adippe, Lathonia, media, pruni, betulæ, Bætica, Machaon, Daplidice, cratægi, fuciformis, russula, facelina, *B. Trifolii*, quercifolia, ilicifolia, erosaria, tiliaria, roboraria, lacertula, furcula, bifida, fagi, libatrix.—J. Smith, Kilwinning, Ayrshire.

Griffin's "Universal" Fireclay Furnace, complete, with muffle, retort, and tube rings, &c., for chemical and other operations. Exchange for micro cabinet or offers.—T. E. Jobling, Coxlodge Colliery, Newcastle-on-Tyne.

Offered, L. C., 7th ed., Nos. 92, 176, 577, 746, 1480, 1555, and other varieties, for 693, 747 b, 1081, 1347, 1444–5, and some others. Send lists; up to comital number 45 inclusive.—E. de Crespigny, 64 Tavistock Crescent, Westbourne Park.

One hundred species of British mosses, many of them rare, offered for British birds' eggs.—Walter C. Cash, Osborne Road, Levenshulme, Manchester.

East Indian reptiles, preserved in spirits, in exchange for geological specimens, minerals, or natural history objects.—T. C. Maggs, Yeovil.

BOOKS, ETC., RECEIVED.

"Concepts of Modern Physics." By J. B. Stallo. London: Kegan Paul & Co.

"Studies in Microscopical Science." By A. C. Cole, F.R.M.S.

"Land and Water."

"Midland Naturalist."

"Northern Microscopist."

"Ben Brierley's Journal."

"Natural History Notes."

"Journal of the Royal Microscopical Society."

"Scottish Naturalist."

"The Competitor." No. 1.

"American Naturalist."

"American Journal of Microscopy."

"Good Health."

"Canadian Naturalist."

"Bulletin of the Torrey Botanical Club, New York."

"Cosmos: les Mondes."

"Le Feuille des Jeunes Naturalistes."

"Le Monde de la Science."

"La Science pour Tous."

"Revista," Oporto.

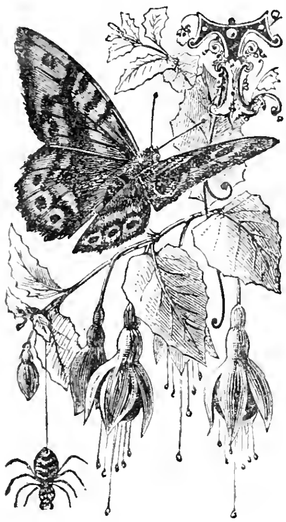
&c. &c. &c.

Communications received up to 12th ult. from:—C. H. G.—J. S.—G. R. V.—R. H. N. B.—B. R.—J. R. G.—A. N.—L. M. A. N.—M. M.—W. B. G.—M. T.—E. R. C.—J. P. H.—D. B.—J. F. R.—A. H. S.—H. H. S.—E. H. R.—A. L.—J. S.—J. N. S.—J. B.—A. H. F.—A. K.—C. B. P.—A. H. S.—G. B.—J. W. R.—B. H.—H. E. W.—J. A. W. O.—J. G. S.—C. H. G.—J. E. L.—J. R.—A. S.—B. R.—J. R. G.—F. K.—J. F.—C. K.—W. S. K.—T. B.—J. R.—C. V. S.—R. R. B.—G. J. J.—A. E. L.—J. S.—E. R. C.—H. C. H.—J. W.—J. E. F.—A. C. O.—C. H. G.—W. B. G.—L. C. T.—T. R. J.—P. C. K.—R. R.—E. F. L.—G. E. M.—T. M. R.—H. P.—J. S. R.—C. H. G.—F. E.—E. de C.—H. P. M.—G. F. B.—T. E. J.—Dr. C. C. A.—C. F. W.—J. A. W.—T. P. B.—Dr. J. A. O.—F. E.—A. S.—H. L.—W. C. C.—F. C. M.—&c.

NOTES ON SOME COMMON SEA-SLUGS.

By Dr. P. Q. Keegan.

[*Continued from page* 195.]



THE nervous system of the Eolidæ is in many respects similar to that of the Doridæ already indicated; the cerebral ganglia are large, there are ganglia at the base of the tentacles supposed to be olfactory in function, and there is a large nerve which passes from the cheeks to the glands of the dorsal papillæ. The organs of circulation are rather simple, consisting of a heart with an auricle and ventricle furnished with valves and arteries and veins, some of which latter accompany the papillæ; but be it observed that the latter have no apparent branchial veins in connection with them. Respiration is performed by the entire surface of the skin, which (including the papillæ) is the theatre of incessant ciliary movement. But perhaps the most interesting anatomical features observable in this family are the digestive organs, and we shall therefore specify their various constituents in detail. An outer and an inner lip lead to the cheeks, which are composed of two horny plates with strong cutting edges, and enclose a spiny tongue adapted for grasping food, and furnished with strong muscles fitted to enact the necessary movements; from the hinder portion of the mouth a short narrow throat passes backwards; and thereon follows a pear-shaped stomach, having a wide extension to the rear, from which branches and tiny tubes extend into the dorsal papillæ, becoming a more or less complicated and developed apparatus for the secretion of the bile, and whence they are continued into ovate vesicles charged with poison-darts or thread-cells, which are vented forth from an opening at the extreme end of the papilla; from the hinder portion of the stomach a short intestine passes off and ends in an anus at the right side of the body.

As these papillæ are the most conspicuous and interesting organs discernible in the Eolidæ, let us perform an experiment in order to demonstrate their structure. Here before us is a choice specimen of *Eolis Drummondi*, waving and flaunting and "dribbling" about in this crystal vase of sea-water. His back quivers with an array of ever-mobile lances, which, when the body is touched, instantly bristle up "like quills upon the fretful porcupine," and curl over towards the point of irritation. Now with a fine pair of scissors let us clip off one of these striped and white-tipped filaments, and covering it on a slide with a piece of thin glass, let us first inspect it with a hand-lens. We now perceive in the centre of the organ a straight reddish-brown canal filled with what seems lighter and denser vesicular or granular matter to near the tip, and then it winds about and seems to enter an ample oval chamber of an opaque-white colour. Placing the slide now under a ¼-inch objective, what do we see? We see a central yellowish canal with its walls slightly waved so as to form little receptacles or follicles, and lined with a number of yellowish or reddish-brown (burnt sienna) coloured globules or accumulations, which seem to be filled with or composed of an oily material, of a lighter or a darker tint. These vesicles seem not to be fixed, but they move about within the gland under the influence of pressure, and they are accumulated in irregular clusters or "mulberry masses" of every shape and size. In some of the species, when these globules are viewed under very high powers, they are seen to be composed of rounded and nucleated granules of various dimensions. These gland-cells secrete the bile from the minute blood-vessels which we now see environed with the longitudinal and circular muscular fibres which so thickly throng the space between the wavy wall of the gland and the external walls of the papilla. Passing the slide now, so as to view the tip of the papilla, we see the aforesaid oval chamber packed with numerous little whitish, elliptical or kidney-shaped bodies, like so many haricot beans of different shapes and sizes. They are on the move, and behold! from two narrow ducts or channels at the extreme end of the papilla there emerge a series of large round bags, each packed full with these thread-cells (*cnidæ*). These bags presently burst and scatter their contents about the slide. Now watch one of the largest of these bean-like bodies, and lo! a nipple projects from one end, and presently a long stoutish thread shoots forth to a considerable distance like the tail of a rocket. This thread is conspicuously thickened at that portion of its length which is next the cell for about the length of the latter, and at a favourable glance of the light we can see a barb-like appearance investing this stouter part. Careful and prolonged observation reveals the fact, that this is composed of a thickish band that clasps round the thread for some distance, and is studded with projecting sharp bristles, that impart to the organ a potent irritating or stinging power. This thread is very insinuating, and can penetrate thickish animal tissue, infusing therein at the same time a fluid of a highly venomous character. We now see how it may be that when this beautiful sea-slug would be confronted by the enemy, the latter in his advances would be pretty sure to "catch a Tartar."

There are upwards of forty British species of Eolis, some of which have the papillæ depressed and overlapping, some present them in a number of separate tufts or clusters, some in rows arranged crosswise on the body, and a very few have a single row of them on each side. Of these various species *Eolis coronata* is in many localities one of the commonest. Its body is about one inch long, and lanceolate in shape; the papillæ are crimson blotched with blue, and arranged in six or seven clusters each containing twenty to thirty or less; the dorsal tentacles are fringed, and the oral ones are long and slender; the tongue has about twenty-three large, strong, comb-like teeth, each cut into sixteen toothlets. *Eolis Drummondi* is about one and a half inches long when fully developed, with the front angles of the foot much elongated; the papillæ are long, reddish-brown with opaque-white tips, and set in four to six clusters; the dorsal tentacles have twenty to thirty rings, and the oral ones are very long, slender and simple; the tongue of the species presents sixteen amber or green-tinted teeth, each bearing nine denticles on each side. [illegible] may be regarded as the non-pareil of this interesting and beautiful genus; it sometimes measures three inches in length, is broad and stout, it tapers gradually to the rear, and is of a brownish colour dappled with white, pink, brown, &c., exquisite organism; the papillæ are marshalled in six to twenty distinct rows, each row composed of about four to six filaments; the dorsal and oral tentacles are short, stout, and without rings; the tongue is thick, fleshy, and dark-coloured, and bristles with thirty plates each cut into about forty denticles; the liver is very highly developed, the central channel of the papillæ giving off on all sides variously sized and irregularly shaped sacs, which are crammed with little compound bags or follicles; the species sojourns between tide-marks on a rocky or shingly coast, where the bottom is a little muddy. *Eolis tricolor* has a yellowish body with orange, violet, and yellow papillæ, which are large, flesh-shaped, and pellucid, and disposed in about thirteen rows of from three to five in each; the dorsal tentacles are smooth, stout, and fawn-coloured, and the oral ones slender. Another species of this family is *Hermæa bifida*, which is tolerably numerous and common. It has a long slim body, and sports a yellowish integument with two reddish lines at the base of the papillæ; the latter organs are arranged tumultuously adown both sides of the back, and they are large and stout, and of a transparent red colour with a deep red central vessel or liver; the tentacles are short and folded lengthwise; there are no jaws, and the animal, which is extremely agile, may be regarded as a link between the Eolidæ and the Elysiadæ; its tongue has forty-nine rows of curiously-shaped teeth.

And now we come to certain genera which may be regarded as forming a separate section or sub-family of Eolidæ, and which, inasmuch as they differ in their external characters from the aforesaid genera, have been relegated to another family by certain adepts in classification. These forms have retractile tentacles sheathed below, the lingual membrane is usually furnished with a series of lateral teeth, &c., and their general aspect may be regarded as something intermediate between the Eolidæ and its nearest allied family the Tritonidæ. Among this sub-group there occur a few creatures which are tolerably common, and are amongst the loveliest inhabitants of the ocean. The parent of so many forms of strange and fairy loveliness hides not within its abysses a more exquisite organism than what is known to science as *Dendronotus arborescens*. Its back bristles with a perfect forest of gills, or rather papillæ, and a tuft of branched appendages projects in front of the head; the dorsal tentacles have somewhat the shape of a penny fly-wheel used by children; the body is beautifully painted and decked with various tints and shades of crimson, reddish-brown, yellow, and opaque-white beautiful to behold; the tongue is an organ of fair proportion, it bears a large broad serrated tooth, flanked on either side by ten oblong, also serrated, teeth; this creature has the faculty of emitting audible sounds; it frequents seaweeds and corallines from low-water to about fifty fathoms depth, and, taken all in all, it is an exquisitely modelled and painted organism, the very non-pareil of British Nudibranchs. *Melibœa coronata* is another beautiful species of the same sub-family. It is about half an inch long, and bears on each side about six hepatic papillæ, which are large, spindle-shaped, and studded with four or five whorls of pointed worts, each tipped by a crimson spot; the dorsal tentacles are thin, transparent, cut short at the top, and rise out of long trumpet-shaped sheaths; the colours are yellow and crimson; the tongue is slender, and bears over a hundred recurved, denticulated teeth arranged in single series; this species flits occasionally ashore, but it resides more frequently among the branches of the beauteous corallines which embellish the floor of the deep open sea.

In addition to the Doridæ and the Eolidæ, there is a third family, the Tritonidæ, which embraces a few British and foreign forms not less lovely, though rather more eccentric in shape, than those already delineated. This family is distinguished by the possession of fringed, feathery, or warty *special* gills distributed along the sides of the back; and it is important to observe, that although these specialised gills surpass those of the Doridæ in extent of surface exposed to the aeration of the water, yet they do not equal them in the perfection of their anatomical relations, for there exists a communication between the different branchial veins and the open spaces of the skin which contain venous blood; and, moreover, the body of the animal has no secondary processes to increase its extent of surface, and sowise materially assist in the process of respiration. The tentacles in this group are retractile into sheaths; the stomach in all the species is quite simple, and the liver compact; and the tongue has a central tooth and several lateral teeth. The members of this family inhabit great depths, but among these we will merely mention *Tritonia Hombergi* and *T. plebeia*, the former of which sometimes attains the length of six inches or more; also *Scyllæa pelagica*, with its curious wing-like lobes, its long, narrow, and channeled foot, adapted to clasp sea-weed, its beautiful tongue rows of seventy-one denticulated teeth, and its curious gizzard, armed with horny, knife-like plates.

The fourth and last family of British Nudibranchs is Elysiadæ, wherein there are no special gills and no distinct mantle, the respiratory function being effected by the dense shrubbery of vibratile cilia which clothes the entire surface of the body; the hepatic organs are branched, extending the whole length of the body, and open into the sides of the stomach; the eyes are seated on the sides of the head, the tentacles are simple or obsolete, and the mouth is armed with a single series of teeth which are disposed in a circle, like those of a circular saw; the heart has an auricle behind, and there are traces of arteries and veins.

We have seen how comparatively trivial and insignificant are the instincts or mental faculties displayed by these sea-slugs. The instinct of seeking and occupying of places suitable to the procuration of food, or for defence against the enemy, low undeveloped powers of sight, touch, taste, smell, and possibly hearing; some are carnivorous, fierce, and voracious, others dilatory, sluggish and sociable, but very little of importance can be gleaned relative to this matter. But there is a question of profounder and more general interest involved in the economy of these creatures, a speculation that to-day agitates the most ingenious of our philosophical zoologists. When we contemplate the peerless beauty and symmetry of form and the gorgeous colouring of these lowly denizens of the ocean, we are naturally induced to consider, why it is that they are nevertheless compelled to "hide their light under a bushel," or (to vary the expression) to "waste their sweetness on the desert air"! How is it that such forms of exquisite beauty and delicacy, of such "fair proportion," some of the loveliest treasures that embellish old Neptune's bejewelled palaces, are not to be found save by diligent and skilful search? that they bury themselves in inaccessible nooks, among rocks, gullies, and ledges of the seashore, or upon the silent bed of the ocean "full fathom five," unseen by men, by those who, of all God's creatures, are most competent to perceive and enjoy such æsthetic excellencies? Can we trace or imagine any relation between the beauty of these animals and any function which is essential to their life or existence? Or is their ornament and variety of form and colour bestowed upon them by the Creator merely for the sake of these qualities, and without any reference to utility of any kind whatever? Are these ostentatious colours of any service in regard to protection, concealment, or warning? Are they caused by the direct action of climate, soil, or food? Are they due to a prodigality of life-energy effecting great and rapid development in certain tissues, &c.? And, finally, is sexual selection concerned in their production in any way? Mr. Darwin and his disciples would endeavour to resolve all beauty into utility, i.e. all animal beauty is of some use in the economy of the animal, or is indispensable to some function to be effected during its life-history. That eminent biologist has been led to the ridiculous conclusion, that active or voluntary sexual selection is one of the chief causes, if not the chief cause, of all the variety and beauty of colour we see among the higher animals. Mr. Wallace thinks that the need of protection, &c., is a far more efficient cause of variation of colours; and he considers that colours are produced or intensified by processes of development, as where, for instance, there is a surplus of vital energy, &c. This latter view has the ring of soundness; but perhaps it is only a specialised or modern physico-material edition or modification of what loomed before the minds of some of the old Greek philosophers, when they proclaimed that beauty is merely the outward expression of some form of good or perfection, or that it is the outward manifestation of the true or the good. The man or the animal that is in the truest, best, and most harmonious condition, i.e. in the most healthy condition of body and mind, is certain to embody or shadow forth some form of material or moral beauty. Men or animals of the greatest individual force, or who have been procreated by parents of signal individual force, or under circumstances where force and intensity find free scope, are almost certain to embody in themselves the elements of personal beauty. With regard to the Eolidæ, there is little doubt that, physically or chemically speaking, their superb colouring is due to the action of their well-developed liver modifying in some way the primary pigment matter of their blood; and there can be little question that the prodigal vital energy displayed by them is the grand cause of the efficient operation of this hepatic chemical process.

NOTES ON A PECULIAR ROTIFER.

I BEG to send you a description of a new rotifer, exhibited by me at one of the meetings of the East Kent Natural History Society some time back. Your readers might search for it wherever the *Riccia*

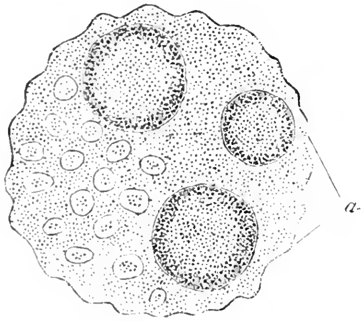


Fig. 145.

fluitans may be found. I trust that my description will assist any one who may have the patience to look for it, and enable him to make it out.* I had for a long time in a vase a quantity of the *Riccia fluitans*, which I obtained from a dyke at Sturry, some of which was decaying, and the chlorophyll or colouring matter had left a portion of the vegetable tissues quite transparent. On placing some of the decaying weed under the microscope on January 21st, 1879,

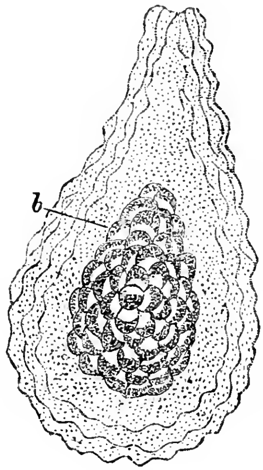


Fig. 146.

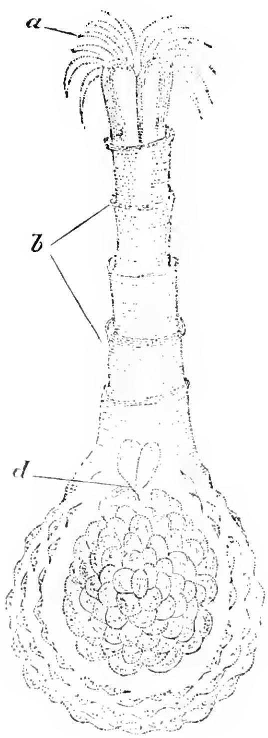


Fig. 147.

I observed some round bodies of an amber colour in which were seen globular forms of various sizes (fig. 145, *a*); they gradually moved and changed their forms, and the round body itself slowly elongated and

* To make cells in which the Riccia or any other object can be easily observed, is well explained and figured in SCIENCE-GOSSIP, vol. xvi., page 270, by Mr. J. A. Allard. I have used such for years; some of those I use are fastened together with the best sealing-wax, others with marine glue; I make them of various depths from the back to front glass, from $\frac{1}{16}$ to ¼ inch, they can be laid nearly flat on the stage of the microscope and the water will not flow out. *Volvox globator*, diatoms, desmids, amœbas, &c., can be examined within them, taking care to add a few drops of water, to supply the loss by evaporation. I have kept the *Melicerta ringens* in one a ¼ inch deep from front to back glass, on a piece of anacharis, for over four months, and have seen young ones continually produced, and have them living at this time; I have seen the whole process of building up their cases from the very first beginning, and by mixing a very small portion of carmine in the water, the manufacturing of the pellets in the pellet cup is plainly observed. I have seen the young commence building their cases, and in five hours produce 400 pellets.

took the form of fig. 146, the contents in the centre of which (at *b*) were seen to move and turn half round backwards and forwards, a motion frequently seen in some rotifers, and in the ova of many small animals.

In about three hours after the globular body (fig. 145) had taken the form of fig. 146, a sort of tube or shaft gradually protruded from the small end, and soon displayed a row of rather long vibratile cilia rotating on the top (fig. 147, *a*); the tube when elongated was quite as long as the diameter of the oval-shaped body, it was telescopic in form (fig. 147, *b*), and could under alarm be quickly withdrawn into the body. After the alarm had subsided the tube was again cautiously put forth, when at first a sort of horn, and sometimes two, were protruded at the top (fig. 148, *c*) as a kind of feeler previous to again displaying the wheel of cilia. The jaws were placed at the bottom of the tube (fig. 148, *d*) and very plainly seen in motion in the act of feeding. The peculiarity in the position of the jaws is quite a distinct feature in the economy of this rotifer, as in every other rotifer with which I am acquainted. The jaws are all situated very close up to the ciliated lobes at the head, but this one has them placed as shown in fig. 147 and 148, close to the stomach, where the process of digestion is seen taking place, in the backward and forward motion before alluded to, hence none of the other rotifers can be mistaken for this one. These rotifers appear to be lodged in the cellular tissues of the plant, and at times they protrude their ciliated lobes just out of the cell of the plant, while their bodies remain fixed. They are very small; I make them out to be only seven, one-thousandth of an inch in length. I endeavoured to isolate some of them, and to get them clear of the decaying vegetable matter in which they were imbedded, but this proved very troublesome, and I lost several in the attempt. The telescopic form of the tube was very plainly seen either in act of protrusion or retraction. At times the tube was withdrawn (the rotifer remaining in a state of rest for five or six hours), and then again put forth with the ciliated lobes and continuing to rotate for the same length of time; sometimes I have known them to continue in motion for over twelve hours. The last I had under observation were four on one piece of the *Riccia fluitans*, they kept alive and in motion without any material change until May 1st, when they all withdrew into the telescopic tube, and remained on the weed; in this quiet state they continued for fifteen days, when they again put forth a long and transparent tube (fig. 149), but no cilia or wheels in motion, the two horns were very prominent at the top (fig. 149, *a*). The jaws were not visible as before, neither were the tubes of a telescopic form as at first; they appeared to be stretched out to their full length, and the folds which formed the telescopic feature

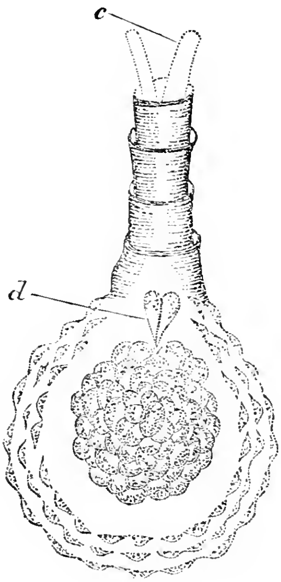


Fig. 148.

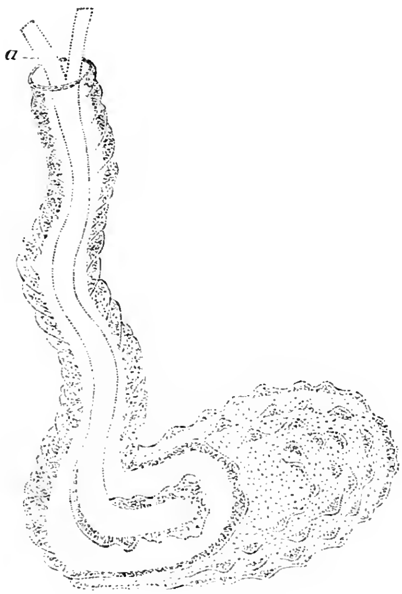


Fig. 149.

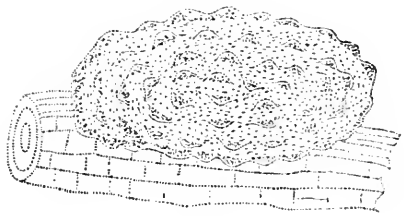


Fig. 150.

in them was obliterated, and they bent and folded themselves down in a worm-like form; this change in the form of the creature I believe to be the prelude to their death. In this worm-like form they continued for three days, and finally escaped into the water. I then lost sight of them entirely. The oval-shaped case out of which they came remained on the weed almost entire, as fig. 150.

How the ova were first introduced into the plant, I was not able to make out. I closely watched to see if they deposited anything in form of ova, but could not discern that they did, as the weed on which they left the case decayed and dropped to pieces, so also did the empty case. A description of these rotifers with drawings was forwarded to the Royal Microscopical Society for inspection, but it appears that no rotifer answering to these had hitherto been observed or noticed in fresh water. The *Freia ampulla* (of Claparède and Lachmann) was pointed out to be the nearest in form to them, but that is a marine specimen, and the only resemblance it had was in the form of the telescopic tube. I give the rotifer the name of Freshwater Ampulla (Lat. a bottle) as most appropriate to its form.

JAMES FULLAGAR.

Canterbury.

NOTES ON NEW BOOKS.

THE close of the summer suggests the employment of the lengthening evenings in turning over the pages of New Books. This season has not been distinguished by any great scientific works, with the exception of Saville Kent's magnificent *Manual of the Infusoria* (London: D. Bogue), to the conclusion of which we have already drawn attention. But numbers of very interesting works have appeared, most of them worthy of perusal, and a few of careful study. The scientific student will be grateful to Messrs. Kegan Paul, for the instalment volumes of the now celebrated "International Library." When completed, this collection of cheap volumes, each written by a specialistic writer on his own subject, will be the finest library of the kind yet attempted.

Several of these volumes have appeared since our last notice, of which, perhaps, the chief is that on *Ants, Bees and Wasps*, by Sir John Lubbock, D.C.L., F.R.S. The success of this book is indicated by its passing into a second edition within a fortnight. Everybody has learned (even through the mediumship of the newspapers) to connect Sir John Lubbock's name with these insects. This volume gives a summary of experiments and results, especially with ants, of a very interesting, and even amusing and surprising character. In every respect the book is most attractive, and one reads it like a novel, sometimes wondering which most to admire, the ingenuity of the author in devising experiments, or of the wise little folks experimented upon. To the psychologist the results are most valuable, tending as they do to establish identity of mental processes in bees, ants, and men.

Another volume of the same series is that on *Animal Intelligence*, by Dr. G. J. Romanes. This is a subject which the author has rescued from the chaos of ill-read and worse observed speculation and discussion, and raised it to a higher and more scientific platform. This volume is a kind of text-book of the facts of comparative psychology, and the well-authenticated facts bearing on instinct and intelligence in the lower animals are here scientifically arranged and compared. Moreover, the author treats his facts in the new light of evolution. Everything relating to animal intelligence, is considered in relation to the theory of descent. We may state that the book is intended to lay a firm foundation for another, projected by the author on "Mental Evolution." Nobody is better capable of taking up this matter and effectually dealing with it than Dr. Romanes.

Concepts of Modern Physics, by J. B. Stalla, is the last volume of the "International Library," issued. It is a contribution, not to physics, or even metaphysics, but to the theory of cognition, and it deals with the true relation of the physical sciences to the general progress of human knowledge. The author shows that many of the problems of cognition are in need of being stated anew, so as to be rationalised. Our readers will therefore see that this is a very thoughtful and desirable book to read.

Geological Sketches at Home and Abroad (London: Macmillan & Co.), is a collection of essays and papers by Professor Arch. Geikie, F.R.S., which have been contributed to various magazines and learned societies. They form a very attractive volume, full of agreeable reading, in which geological observations and inferences, are stated in a manner of which Professor Geikie seems to have the sole secret. In character these papers vary from those of the most elementary and scientific character such as "My First Geological Excursion," to others, which deal with the latest outcome of geological discovery, and which even yet bristle with many formidable points, as those on "The Lava-fields of Western Europe," "Geographical Evolution," "A Fragment of Primeval Europe," &c. But Professor Geikie is secure of any reader who is tempted to peruse a chapter, and so we cordially recommend this book, as one certain to give both pleasure and profit.

Studies in Nidderdale, by Joseph Lucas, F.G.S. (London: Elliot Stock), is another valuable book, taking up much new literary ground, and showing how a locality may yield ethnological, archæological, folk-lore, and other kinds of information if a man goes the right way to work and is fit for the task imposed on him. Mr. Lucas takes the not very popularly known Valley of Nidderdale in North Yorkshire, and from the quaint dialect he extracts the Gaelic, Anglo-Saxon, Danish, Norwegian, and other words, which tell of the early inhabitants of the region. The structure of the old houses, barns, sheep and cow-pens, the fixtures of the houses, the ovens, bakestones, pots, chimney ingles, cheese-presses, the very names given to the dogs, all are passed through a critical dissection, and made to yield unlooked for and valuable archæological information. The influence of the physical features of the district on farming, the habits of the people, the names, &c., is very ably traced. There are studies of plants, birds, and mammals of the dale, inter-sprinkled with much folk-lore. And lastly there is a glossary of the county words, with their lingual derivations. We congratulate Mr. Lucas on a novel, but valuable and deeply interesting book.

Notes on Cage Birds, edited by Dr. W. T. Greene (London: L. Upcott Gill), appears under the literary supervision of our old and valued contributor to SCIENCE-GOSSIP. Dr. Greene has made the natural history of domesticated pets his own study, and the publishers of this book did well to secure his services as editor. It contains practical hints in the management, breeding, diseases, and cures of British and foreign cage birds, hybrid, canaries, &c. As we have been frequently asked to recommend a work on this subject, it is with much pleasure we draw special attention to that before us.

Studies in the Theory of Descent, by Dr. Aug. Weismann, translated by R. Meldola (London: Sampson Low & Co.), is the third part of this deeply interesting work, dealing with the transformation of the Mexican Axolotl into Amblystoma and containing an essay on "The Mechanical Conception of Nature." We have already drawn attention to the two preceding parts, and think it is a pity the work did not conclude (as regards the English translation) with the second part. It would then have been more uniform in character and subject.

Modern Elementary Chemistry, by E. W. Volckxson, F.C.S. (London: Kegan Paul & Co.), is in reality a collection of answers to all the questions in chemistry which have been set for candidates at the matriculation of the University of London during the last forty years.

Faith the Life-Root of Science, &c., by H. Griffith, F.G.S. (London: Elliot Stock), is a very thoughtful, reverent, and even enthusiastic endeavour to harmonise the loftiest scientific discoveries and generalisation with religious belief. The author displays evidences of extensive reading and research. This is a little work eminently worth reading.

Remote Antiquity of Man Not Proven, by B. C. Y. (London: Elliot Stock), is unanswerable, but not from the point of view the author adopts. It is unanswerable because no scientific man will think it worth while to lose time in attempting to answer it. And so the author may pose as having maintained his position, because people have something else to do than slay the slain. Denying the evidences of the antiquity of man (additional proofs of which are coming in week after week) is now very properly placed among that category of denials which includes the rotundity of the earth, and the origin of species. And yet the author displays intelligence which indicates he might have done better.

NOTES ON THE SCHIZOMYCETES.

[*Continued from page* 202.]

No. III.

V. BACTERIUM, Cohn. Cells *shortly cylindrical, elongated-elliptic or fusiform*, increasing by transverse division, *spontaneously motile.* The daughter-cells either separate from one another *soon* after division, or remain united in a chain of two or more. The formation of a Zooglœa is also frequent. *Spore formation* like that of Bacillus.

A.—COLOURLESS SPECIES.

24. *B. Termo*, Dujardin.
Monas Termo, Müller.
? Palmella Infusionum, Ehrb.
Zooglœa Termo, Cohn.

Cells shortly cylindrical, oblong, about $1\frac{1}{2}$–2 μ long, with a flagellum at each end.

In the most various substances capable of putrefaction, especially in great numbers in macerations of meat, etc.

Bacterium Termo is the ferment of decay; it produces the decay of organic substances, and multiplies abundantly so long as any putrescible material is present, while it disappears when the decay is completed. It may be obtained with certainty by putting a piece of meat into water, and leaving it to itself, allowing the vessel to stand open in a warm place. In consequence of their enormous power of multiplication, the Bacterium cells which are conveyed by the air into the fluid, or which adhere to the meat, form in a short time so numerous a progeny, that even in twenty-four hours the water shows a decided milkiness, which is caused by the fungus-cells floating in it. Moreover that *B. Termo* is the cause of the decay, and does not, as might be supposed, appear secondarily in the decaying substance, is easily shown by a simple experiment. For if the air is allowed to penetrate without hindrance to a putrescible substance, the decay begins very soon, because the air always contains a number of Bacterium-cells. But if the putrescible organic substance is strongly heated (above 50° C.) and then protected from the air, it does not putrefy. It might indeed be objected, that the air itself or the oxygen thereof causes the decay; but this objection also can be easily refuted. Air may be admitted to easily putrefying substances which have been strongly heated, but be deprived by filtration through cotton-wool of solid bodies (and therefore of Bacterium-cells)—and in spite of the admission of air no decay will result.

25. *B. Lineola* (Müller), Cohn.
Vibrio Lineola, Müller.
V. tremulans, Ehbg. (Infusionsth., p. 79, *sec.* Cohn!)
Bacterium triloculare, Ehbg. (l. c. p. 75).

Cells exactly similar to those of *B. Termo*, but larger, 3 to 5 μ long, as much as $1\frac{1}{2}$ μ broad, with two flagella at one end.*

In various infusions, without especial fermentation.

26. *B. litoreum*, Warming.

Cells ellipsoidal or elongated, gradually rounded off at the ends; length 2–6 μ, breadth 1·2–2·4 μ;

Fig. 151.—*a*, *Bacterium Lineola* (after Cohn).

Fig. 152.—*b Bacterium fusiforme* (after Warming).

Fig. 153.—*Bacterium litoreum* (after Warming).

Fig. 154 (× 650).

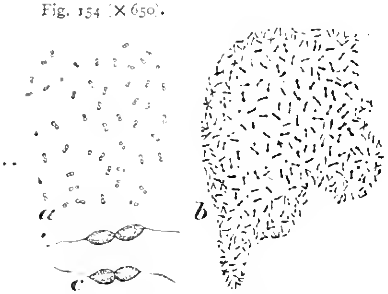


Fig. 156 (× 4000).

Fig. 155.—*Bacterium termo*; *b* is the zooglœa form (× 650).
(*a* and *b*, after Cohn; *c*, after Dallinger.)

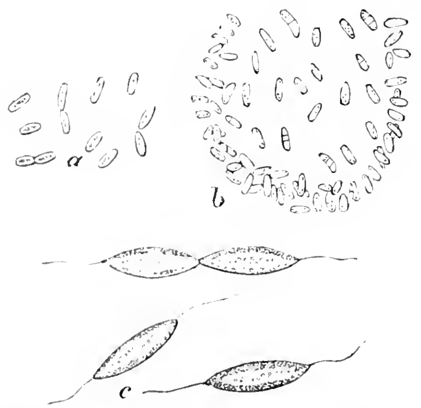


Fig. 157.—*Bacterium Lineola*, *b*, the zooglœa form (*a* and *b*, after Cohn, × 650; *c*, after Dallinger, × 3000).

colourless, motile or stationary, but never united in chains or Zooglœæ, nor in large heaps.

Only in sea-water.

27. *B. fusiforme*, Warming.

* The text says "mit zwei Geiseln an einem Ende"; but see the figures.—Tr.

Cells fusiform, with very acute ends, 2–5 μ long, ·5–·8 μ thick, in a spongy layer on the surface of the water.

In sea-water.

28. *B. Navicula*, Reinke and Berthold.

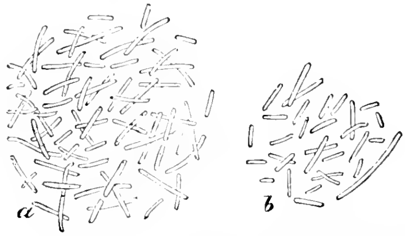


Fig. 158.—*a*, *Bacillus Anthracis*, from the blood of a cow that had died of splenic fever, examined after death; *b*, *Bacillus ruber* (after Cohn) × 600.

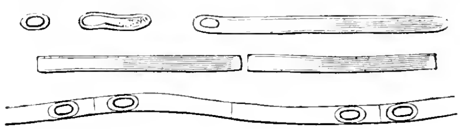


Fig. 159.—Development of *B. Anthracis* from a spore, and formation of spores in the threads (after Ewart).

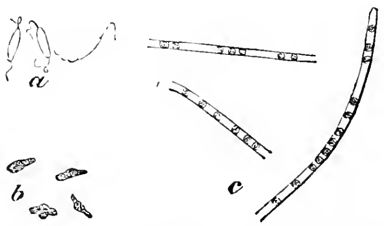


Fig. 160.—*a*, *Bacillus subtilis*; *b*, *Bacillus tremulus*, with spores; *c*, *Bacillus Anthracis*, united in threads, forming spores (all after photographs by Koch) × 500.

Cells fusiform or elliptic, narrowed towards both ends, pretty large, partly motile, partly stationary, with one or more dark spots in the interior, which are coloured blue by iodine.

In rotting potatoes.

B.—Pigment-forming Species.

29. *B. synxanthum* (Ehbg.), Schröter.
Vibrio synxanthus, Ehbg.
V. xanthogenus, Fuchs.

Morphologically not different from *B. Termo*; ·7–1 μ long, moving actively, single or united in chains up to five in number.

Causing the so-called "yellow-milk."

Milk, which has been boiled, and some time afterwards coagulated, often suddenly assumes a lemon-yellow colour, while the caseine by degrees nearly disappears. The milk, originally neutral, becomes first acid, and then intensely alkaline. The filtered lemon-yellow fluid becomes amber-coloured on evaporation; the resulting yellow-brown crust is not soluble in alcohol or ether, but completely so in water. Alkalies do not affect the colour, which is instantly changed by acids.

30. *B. syncyanum* (Ehbg.), Schröter.
Vibrio syncyanus, Ehbg.
V. cyanogenus, Fuchs.
Morphologically the same as the preceding.
Producing the "blue milk."

The colouring matter is changed by potash or soda into a peach-blossom red, while acids restore the original colour. Ammonia, on the contrary, only slightly changes the blue to violet.

31. *B. æruginosum*, Schröter.
In the so-called green or blue pus, which is at times found in wounds, etc.

Even in this case the actively moving fungus-cells are themselves colourless; they secrete the colouring matter, which is verdigris-green, often passing into blue, in the matter which surrounds them.

The species are partly always motionless, partly spontaneously motile, passing however at times into a condition of rest. The rod-like cell lengthens itself by intercalary growth to about double its original length, and then breaks up by a transverse division into two daughter cells, which often separate from one another, often also remain united. Since the products of repeated divisions are arranged end to end, there arise filaments which are often bent in a zigzag fashion, often also straight, apparently unjointed, but the joints may be brought into view by the application of staining materials. The development and germination of the spores in *Bacillus subtilis* are as follows:—The greater portion of the contents collects itself into one part of the rod, which often appears as a swelling and is sharply marked off from the other empty part of the cell. Afterwards this strongly refringent darkened body (the spore) disarticulates itself from the sterile part of the cell; this latter perishes, leaving the perfect spore behind. These spores possess the power of withstanding adverse influences of different kinds without injury to their vitality. They can remain a long time in the earth, often not to proceed in their development for years, but they can also germinate forthwith. On germination the spore first loses its brilliancy and swells up somewhat; then the membrane of the spore is torn in the middle. The inner part of the spore is protruded through the fissure, and grows into a new rod-like cell, the base

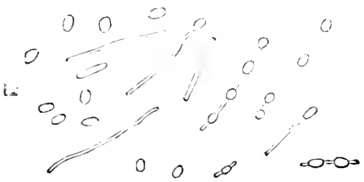


Fig. 161.—*Bacillus subtilis* (after Cohn) with spores.

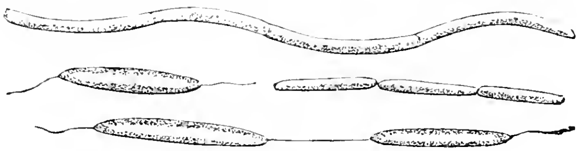


Fig. 164.—*Bacillus subtilis* (after Dallinger) × 4000.

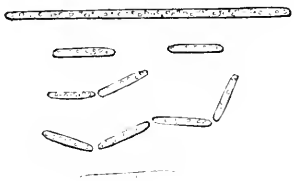


Fig. 162.—*Bacillus Ulna* (after Cohn).

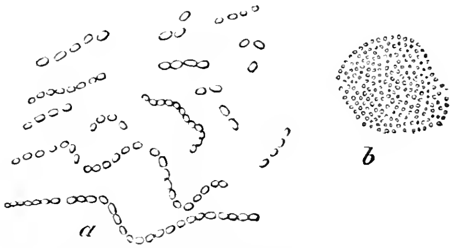


Fig. 165.—*Micrococcus bombyces*, from the gastric juice of a living silkworm (after Cohn); *b*, *M. fulvus* (after Cohn).

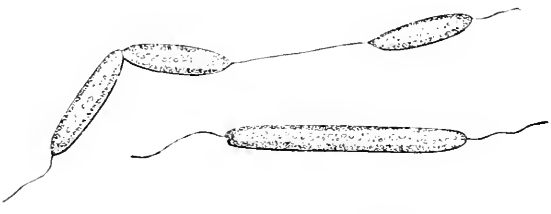


Fig. 163.—*Bacillus ulna* (after Dallinger) × 3000.

VI. Bacillus, Cohn. Cells *elongated cylindrical*, almost always combined in straight rod-like (*not at all or slightly constricted*) rows or threads, increasing by transverse division. They form a Zooglœa, but often also occur in dense swarms, without the secretion of gelatine. *Reproduction by spores.*

The genus Bacillus is very near to Bacterium; *Bacterium Lineola* especially is very similar to single Bacillus cells. But they can be distinguished by the fact that in the longer Bacterium cells self-division has already begun, while in equally long Bacillus cells no trace of division can be perceived.

of which is still enclosed within the rent membrane, which is frequently not thrown off till long afterwards. The demarcation of the different species is difficult in this case also.

A.—Colourless Species.

32. *B. subtilis* (Ehbg.), Cohn.
Vibrio subtilis, Ehbg. (Infusionsth., p. 80, No. 91; pl. 5, fig. 6).

Cells cylindrical, about twice as long as broad, as much as 6 μ long, furnished with a flagellum at each end. Usually several united together in pseudo-filaments, which are likewise motile, flexile, and provided with a flagellum at each end. Spore-forming rods three or four times as long as broad, isolated or united in threads. Spores for the most part somewhat thicker than the rods.

In various infusions and substances; most probably also in the rennet-stomach of living animals.

According to Cohn, it produces the butyric fermentation and is also the efficient cause in the ripening of cheese.

An extraordinary and peculiar power of resistance is possessed by the spores of *B. subtilis* and other species. They are not killed off by boiling, but are thereby excited to speedier germination, which of course brings into consideration the duration of the boiling. A quarter of an hour's boiling does them absolutely no harm, while after an hour most of them, and after two hours all of them are killed. Heating them above 80° C. kills them sooner. They are not affected by poisons and weak acids.

33. *B. tremulus*, Koch.

Very similar to the preceding, but more slender and usually also shorter, always with a flagellum at each end. Spores conspicuously thicker than the cells, often lateral.

On the surface of decaying plant infusions, forming a thick gelatinous membrane.

34. *B. Amylobacter*, Van Tieghem.

Morphologically like *B. subtilis*, but distinguished by the fact, that at certain times it contains starch in its cells, which can be easily recognised by the blue colour produced on the addition of iodine.

In the cells of laticiferous plants, in decaying plant infusions, etc.

According to Van Tieghem's first communications, this species is the cause of cellulose-fermentation. Afterwards *B. Amylobacter* (and not *B. subtilis*) was indicated by him and Prazmowski, (Bot. Zeitung, 1879, No. 26) as the ferment of butyric fermentation (*Vibrion butyrique* of Pasteur). According to Prazmowski *B. Amylobacter* is especially and essentially distinguished from *B. subtilis* by the mode of germination of the spores. The germinating thread in the former species is protruded not at the equator, but at one of the poles of the sphere. But it appears to me inadvisable to found a new species on this distinction, as Prazmowski desires.*

35. *B. Ulna*, Cohn.

Threads broader than in *B. subtilis*, slightly flexile, with a dense fine-grained plasma. Single cells as much as 10 μ long, 2 μ broad. Spores oblong-cylindrical.

In various infusions, *e.g.*, of white of egg.

Appears to be scarcely different from *B. subtilis*. Intermediate forms between the two have been observed.

36. *B. Anthracis*, Cohn.

Exactly like *B. subtilis*, but motionless * and without flagella; cells 4 μ or more long, very slender, for the most part united into long, often bent, threads. Spores not at all or little thicker than the threads.

In the blood of animals which have died of splenic fever; the cause of splenic fever in cattle, sheep, etc., and of "pustula maligna" in man.

B. Anthracis and the pathological phenomena engendered thereby are the most accurately known of all the diseases induced by Schizomycetes. The Bacilli are found without exception in the blood of animals which have died of splenic fever, and it is sought to infer that they are the cause of the disease. So long as only the vegetative threads were known, it was difficult to prove this; for these are capable of living only a relatively short time, and blood which contains them alone soon loses its power of infection. The remarkable thing about splenic fever, however, is that it often breaks out in a neighbourhood quite suddenly, then disappears for a long time, to appear again just as unexpectedly without any transference from without having taken place. From these facts it must be concluded that the contagium can preserve its infectiveness for a considerable time. The discovery of the spores of *B. Anthracis*, which nevertheless are formed only in the blood of dead animals, or when the blood of animals affected with splenic fever is slowly dried, explains this long-lasting power. For, moreover, the spores of *B. Anthracis* possess great capabilities of resistance to external influences, especially to dryness, so that they are capable of further development even after years. These spores are buried in the ground with the bodies of diseased animals which have died, and when there various means of dispersion are open to them. If then they get in any way into the bodies or the blood of cattle, etc., they germinate, the rods which proceed from them multiply in abundance and soon commence their destructive work.

B.—Pigment-forming Species.

37. *B. ruber*, Frank and Cohn.

Rods 6–8 μ long, scarcely 1 μ thick, actively motile, isolated or united from 2 to 4 together. Dividing rods sometimes shorter, only 3–4 μ long. Secreting a brick-red pigment, which is different from that of *M. prodigiosus*.

On boiled rice.

38. *B. erythrosporus*, Cohn.

Motile, short, slender rods, partly forming longer threads, in which numerous, oval-oblong, bright shining, dirty red-coloured spores arise.

On a solution of extract of meat, putrefying infusions of white of egg, and putrefying macerations of meat.

This species forms partly little floating scales, partly continuous membranes; the threads finally dissolve to a jelly, thereby freeing the spores, which then sink to the bottom, united in little gelatinous heaps. The species is easily recognisable by the dirty red colour of the spores.

W. B. Grove, B.A.

(*To be continued.*)

Erratum.—In part of last month's issue, the description of fig. 140 is incorrect. It should read "*b*, an older spherical family; *c*, part of *b* × 300." Also, to fig. 137, for "Solles" read "Tolles."

* As little is known about *B. Amylobacter* in England, I append a passage of Van Tieghem concerning it, translated from the Bulletin of the Société Botanique de France, 1880, p. 284. "Ordinarily, as we know, when *B. Amylobacter* attacks starch-containing parenchyma, it first dissociates the cells by dissolving their intermediate lamellæ; then it causes the membranes of the cells thus separated to swell up, and dissolves them by degrees, without attacking the granules of starch which they enclose (as in potato, bean, etc.). In *Adoxa Moschatellina* it is quite different. The *Amylobacter* still begins, it is true, by destroying the intermediate lamellæ, and separating the cells, the punctations of which" (he is speaking of the sub-epidermal layer of the rhizome, macerating in water) "are then open to the outside. Penetrating into the cavity by one of these punctations, it proceeds to develop itself there among the starch granules. At the same time it attacks these granules, and causes them by degrees to disappear, without exercising any action upon the cellulose membrane. When it has completely dissolved and absorbed the grains of starch within the cell, the *Amylobacter* forms a brilliant spore in each of its articulations, and disappears. With its membrane unaltered, and the mass of spores which fills it, the cell then fulfils the part of a sporangium." According to Van Tieghem, it is the action of this saprophyte which causes plant-tissues, immersed in water, to decay.—Tr.

* This is now known to move at one stage of its existence, and also to form a Zooglœa; Q. J. M. S., xviii., 163.—Tr.

A COLLIER'S EXPERIENCE OF SECTION CUTTING.

WE have much pleasure in laying before our readers the following quaint and humorous experience of cutting coal sections. Mr. Simms is an old correspondent of SCIENCE-GOSSIP, and known to us as one of the thousands of intelligent worthy men to whom natural science is one of the greatest pleasures of life.

We may add that the "grey-streaked" coal section to which he refers, a specimen of which was sent us for examination, is crowded with the annuli which usually surround the sporangia of ferns. See illustrations of Mr. Mello's article, *Hymenophyllum*, fig. 84, p. 124, of SCIENCE-GOSSIP for June last.

"Many years ago, I had a very ingenious companion who, out of some rough lenses he ground and polished, succeeded in making a moderately good microscope. Well, we got some idea that the "Micrographic Dictionary" contained some information in regard to cutting coal sections. Living on a coaly surface, and having thousands of pieces of coal almost daily through our hands, it was natural to think we should be eager to see this information. So one Friday afternoon it was arranged for my friend to go to Newcastle and get an introduction to the Literary and Philosophical Society, and see for himself what this great book contained. Saturday morning came, and the weather being fine, and the distance to Newcastle being about seven miles, my friend, too poor to train, set off to walk, with sixpence in his pocket which I had given him to spend. In little more than four hours he returned home, and was so much overjoyed with the news that he scarcely knew how to tell his story, and had even forgotten to spend his sixpence on the road. We now had the information, but had not any potash. Saturday morning came again, and the rain coming down in torrents, off he goes again to Newcastle, and returned so drenched that the potash and bottle seemed nearly washed away. We selected four pieces of coal, two shiny ones, and the other two pieces very coarse. They were carefully placed in a bottle to remain there for a week; the week got away and no change took place in the coal, although the razor was ready. This was a sad disappointment to us. The bottle was again put away for a week, and again we were met with a disappointment. The bottle was once more put away for a fortnight, making a month, with no better results. Put away again for a month, and still no alteration. Another month passes away, and still the coal would not cut. Now three months' soaking did not the least affect our pieces of coal. So they were put away for three months more. How deeply grieved we were when we found that with six months' soaking the pieces of coal were as hard as when we took them from the heap. We were now sadly at a loss to know how to proceed. Could it be that we were only country hodges? We again set the bottle to its place for other three months, and a week before the expiration of the time, my friend got a blow in the pit and died in a few days. Our pieces of coal were now thrown into the ash-pit as useless. Nothing more have I seen of cutting sections of coal until these letters that have appeared in the recent Nos. of SCIENCE-GOSSIP, so your readers will have a good idea how interested I must be on this subject. A few years ago another Microscopic friend of mine met with some grey-looking streaks of coal, about one foot from the top of the Low Main Seam in the Newcastle coalfield. Now these grey streaks of coal cut, grind and polish well, and mount easily for the microscope, and when seen under the instrument show a mass of open structure filled with a resinous-looking substance. Enclosed is a section of this coal, and I would like you to describe the section yourself. The coal has never been figured, and I fancy would help to solve the question of coal sections. Now these grey streaks, although taken from the body of coal, cannot be said to be ordinary coal. I still hold that ordinary coal cannot be softened, cut, or sectioned.

"JOHN SIMMS."

MUHLENBERG'S TURTLE (*CHELOPUS MUHLENBERGII*).

IN SCIENCE-GOSSIP for February, 1876, I remarked, that "from my study window I have an unbroken view of a broad expanse of meadow, dotted here and there by single huge hickories, a willow hedge, and margined beyond by the broad expanse of the Delaware River." I might have added, that a weedy creek meanders through the tract, and therein are to be found, not only the fierce snapping turtle, of which I then wrote, but seven other species of strictly aquatic turtles. For the sake of those who desire further particulars, I will enumerate them. They are Muhlenberg's turtle (*Chelopus Muhlenbergii*), the Rough-backed turtle (*C. insculptus*), the Painted turtle (*Chrysemys picta*), the Red-bellied terrapin (*Pseudemys rugosa*), the Speckled turtle (*Nanemys guttata*), the Mud turtle (*Cinosternum Pennsylvanicum*), and, lastly, the Musk turtle (*Ozotheca odorata*). Certainly, if one is disposed to study the habits of the Testudinata, here is a sufficiency of material; and I am ashamed to admit that although my opportunities have been so good, I have made so poor a use of them. Of the seven species here mentioned, the first is extremely rare, and almost nothing has been recorded of its habits. In his celebrated monograph on American Testudinata, Agassiz disposes of the species in half-a-dozen lines, having been unable to gather any living specimens. Holbrook, in his North-American

Herpetology, gives no particulars as to its habits, beyond the presumption that it is a terrestrial rather than aquatic species. De Kay, in the Natural History of New York, merely mentions the fact that it is very rarely met with.

Muhlenberg's turtle is an exceedingly dull-coloured, unattractive species, having no bright points or lines to relieve the uniform brown-black of its upper shell. The species may be at once recognised, however, by the large, usually confluent, bright orange spots on the back of its neck. Nothing at all similar to these spots are found on any other of our American turtles.

Early in May, 1881, I was so fortunate as to find two pairs of these rare turtles. They were found in the mud of a shallow ditch in the meadow. Their movements, when discovered, were exceedingly sluggish. They made no effort to escape, and when handled offered no resistance. On the contrary, each withdrew its head, feet, and tail within its shell, making a scarcely audible hissing sound as it did so.

These four specimens I kept in captivity for a short time, and then placed them in the Museum of Comparative Zoology, at Cambridge, Massachusetts. Before parting with them, I determined conclusively that these turtles possessed well-defined vocal powers; but I have not been able to learn that in their new home they ever exercised them in the hearing of their custodian. To this subject I will return.

In May, 1882, my son found a single specimen of these turtles in a small swamp. It was crawling at the time, on the muddy margin of a spring brook. This specimen was placed in an enclosure about six feet square, in which was a shallow basin filled with water, sunk to the level of the ground. This basin of water was at once discovered by the turtle, and straightway occupied, to its evident satisfaction. In the course of a few days the turtle became quite ill at ease, and wandered restlessly about, anxiously looking for some opening in the pen—as I thought—through which it might escape. Finally, it dug a shallow hole in one corner of the enclosure, and sat therein much of the time. I had hopes that it would burrow deeply and thus make an effort to escape, but it did not seem disposed to do so, although the earth was a loose sand, through which a land tortoise could have made rapid progress. I therefore incline to believe that in winter these turtles hibernate in the mud, beneath the water of ditches or ponds, rather than bury themselves in higher and drier localities.

Ten days later, my son was fortunate enough to find a pair of these turtles in the same meadow-ditch from which I had taken my specimens, the preceding summer. These turtles were evidently mated. They certainly were very affectionate, and remained constantly together. Here it may be well to refer to a passage in Agassiz's monograph on our turtles. On page 300, he remarks: "The legs"—of turtles—"which, as in lizards, seem to be subservient only to locomotion, perform, in addition, functions which we would hardly suppose in these animals. Professor Jeffries Wyman had once the rare opportunity of watching two painted turtles while making love, and he saw the male caressing and patting the head of the female with its fore feet for several minutes."

On the 3rd of June, my son found a second pair of these turtles. I had now five individuals in the enclosure referred to. The small basin, which was kept well filled with water, was the point of attraction of their cramped surroundings. It was continually occupied by three of them, as there was no room for the others; but, on the other hand, the others closely watched the occupants of the basin, and promptly took their places, when they ventured forth for a stroll about the pen. It was a contest between the "ins" and the "outs" the while; but, so far as I could discover, was carried on quite good-naturedly. Nothing like fighting was noticed, although I closely observed them—myself unseen by them—daily, for a long time. Their appreciation of the little basin of water quite convinced me that these turtles are essentially aquatic, and not a "wood tortoise," as they are called in the text books. Two, probably three, of the five individuals were females, but no eggs were deposited, nor did I find any evidences of digging in the enclosure, as though a desire for ovipositing possessed them. The breeding habits of Muhlenberg's turtle are, I presume, essentially the same as those of the rough-backed terrapin, the nearest allied species. This common turtle digs a hole, some six or eight inches in depth, and twice this measurement in diameter. The bottom is patted down with the fore feet until quite firm. In this excavation the eggs are deposited, and subsequently, very neatly covered by the loose earth which had been removed. In fact, nearly every trace of an excavation having been made is carefully removed.

As to the whereabouts of the Muhlenberg turtles, except in early summer, I am wholly "at sea." For many years I never saw a specimen at any time, and my experiences of the past two years cover only the months of May and June. That they are not in the same shallow ditches, later in the summer, wherein both myself and my son found them in May, I am very positive. That they are not wandering about the woods, howsoever damp they may be, seems to me quite improbable. I have instituted such careful search for them in the very localities where, if wood-haunters, they would surely be, that it is incredible that any of them should have been overlooked. Indeed, the five specimens captured during the past summer were liberated June 15th, and placed in a small brook that ran through a low-lying, densely-wooded valley. Up to the present time (Aug.) no trace of them has been discovered. Were damp woods the summer haunts of these turtles, they would certainly not have wandered far away; and I doubt their being possessed of sufficient cunning to elude my eager search for them. But one other locality suggests itself, and this is the deeper waters of the tide-water creeks, and those swamps that are deep by reason of quicksands. Here, it may be, the summers and winters of this turtle are passed. Indeed, I found that the Muhlenberg turtles that I kept in confinement could readily remain under the surface of the water in an aquarium, for several hours, without apparent inconvenience; and when, later, an individual of this species was associated with one each of the mud turtle, the painted turtle, and the spotted turtle, in an aquarium, the Muhlenberg proved to be as active a swimmer, and remained voluntarily as long beneath the surface, as any of the others. In fact, in its movements and degree of activity, it most closely resembled the mud turtle, posed to consider, and feel little hesitancy in asserting, that the Muhlenberg turtle is essentially an aquatic species.

A few words concerning the vocal powers of this turtle. In the article in this magazine for February, 1876, to which I have already referred, I mentioned the voice of the common snapping turtle. Since then, I have been fortunate enough to hear this same turtle make similar sounds, in its native haunts. In every case, they were made at night; but my opportunities were such, that I am quite positive that the sound heard and the turtle seen were correctly associated.

In the often-mentioned monograph by Professor Agassiz, that author remarks: "Turtles have a voice.

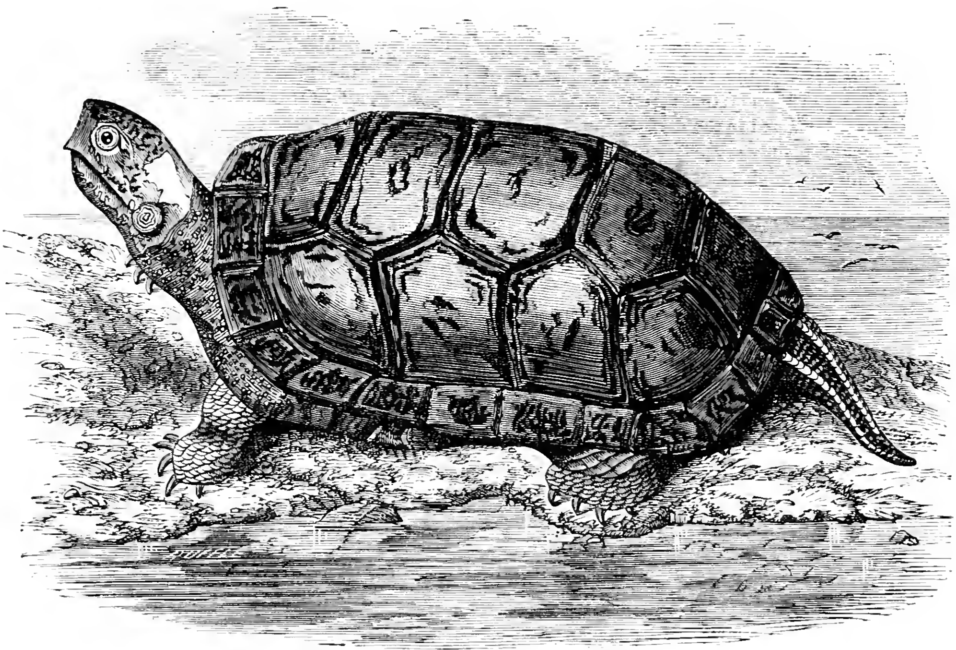


Fig. 166.—Muhlenberg's Turtle *(Chelopus Muhlenbergii).*

which is so essentially an aquatic species. Referring to the respiration of turtles, Professor Agassiz remarks: "In mud and soft-shelled turtles, the lungs being much reduced in size and importance, by far the greater part of the respiration must be performed by the skin of the whole body, which is much thinner in these families than in other turtles; while, on the contrary, in . . . the Testudo (Box tortoise) the powers of respiration are no doubt performed entirely by the lungs" (l. c. p. 276). In the case of the Muhlenberg turtle the skin is not thick, but, being greatly wrinkled, appears so; and the lungs, are, I believe, of about the same size as those of the strictly aquatic species. Certainly they are very little larger, and correspond more nearly to those of the snapper than to the terrestrial box tortoise. Therefore, I am dis-

Though I have myself made this observation only in a few species, namely, in *Emys elegans, serrata, picta* and *insculpta*, which emit a piping note; and in *Chelonia mydas*, whose voice resembles somewhat a quaint, low bark; I am inclined to believe that all of them have, more or less, the faculty of emitting distinct sounds" (l. c. p. 284). It is not to be wondered at that our turtles should have voices, for they are by no means such sluggish, indolent creatures as is supposed by those who have only observed them indifferently or from afar off. I have frequently seen them get up a "square fight" over some delicate morsel, as a dead fish or drowned squirrel; and again, while peering over the side of my boat into the clear depths below, I have watched the spotted turtles, two and three together, go through a variety of erratic movements, strongly suggestive of play. Even the solitary land tortoises will, when they meet, gently touch their noses together, and go through other movements suggesting the expression of ideas to each other. Indeed, I have never seen any animal as high as, or higher in the scale of development than fishes, that did not possess means of communication of ideas to its fellows. I know not in what other way to explain very many of the acts of these animals. To return to the turtles. In May, 1881, my first specimen of Muhlenberg turtle was kept in a small vessel of water, for several days, in a darkened room. Twice, while in the room, I heard it utter a shrill note, which may be represented by the syllables *prēē-āāk*, twice or thrice repeated; the last time less distinctly than the previous utterances. To make it the more certain that the first utterance was not wrongly attributed to the turtle, I caused a ray of light to be thrown upon the vessel containing the animal, and I remained in the dark, but quite near at hand. I could plainly see every movement of the turtle, but do not think I was seen by it. After the lapse of half an hour after the first utterance heard, I saw the turtle come to the surface, and crane its neck as far out of the water as possible. Opening its mouth widely, it made the same utterance, and repeated it, after an interval of probably ten seconds. The sound was different from that of the snapper, but the movements accompanying the utterances identical. Since then, I have not been able to detect any evidence of vocal powers; but it must be borne in mind, that in my subsequent studies of these turtles I had several associated; and if, as I suppose, the note I heard is really a "call," then it would only be uttered by solitary individuals, when in search of a mate.

Early in summer, if at no other time, the voice of *the* turtle *is* heard in the land.

CHARLES C. ABBOTT, M.D.

MICROSCOPICAL PAINTING.

IN the January and February numbers of SCIENCE-GOSSIP, are some observations of mine on this subject. I now append an experience of some importance.

An object for drawing should be magnified to show all the parts necessary for its elucidation, in fact, to understand it as a whole; and, as a rule, it should occupy the entire field of vision. It sometimes, however, happens that many elongated preparations, as for instance, the tongue and appendages of a bee, or a double-stained section of a botanical specimen cannot without reducing the magnifying power to a useless attenuation be included in a circle, as recommended in a former paper, except at the loss of considerable and important detail; in such cases the circle must be abandoned and the drawing made in parts, by shifting the position of the object until the whole is combined on the paper. This is attended with some difficulty, in the management of the camera lucida, but can be overcome in the following manner: Having an elongated object, which cannot be seen in its entirety in one field of view, the process is, to draw the outlines and salient positions of one end, or half-marking two prominent points on the paper corresponding with two places in the subject; these positions are easily remembered. The object is then moved, by the stage adjustments, upwards or downwards, as the case may be, until the other portion is in the field. The marked points are coincided, by shifting the drawing block, and the remainder of the outlines finished; the minute details of the drawing, and painting, afterwards continued from the object itself. By this method, the camera lucida may be used without difficulty with four combined fields of vision, and the various parts of the object so fitted as to result in a drawing of considerable dimensions, perfectly true in its contours. Botanical sections and elongated parts of insects, under fairly high powers, may thus be mapped out with all the details exhibited in their relation to each other.

For good artistic work the importance of double illumination cannot be too urgently advocated. Many beautiful objects are often unappreciated from deficiency, or inapplicability of the light used to exhibit them. It is never more exemplified than in the combined use of the paraboloid reflector and side speculum, with a class of objects lately introduced, of parts of insects mounted in fluid without pressure, avoiding the disturbance of the more delicate tissues. Many parts of such preparation are necessarily opaque, which is rather an advantage from an art point of view, as, by force of contrast, their density aids in giving a most beautiful appearance to the more transparent structures; nothing being crushed or distorted, all is *in situ.* These preparations immediately awaken the mind to the impossibility of properly seeing, or revealing them, by the ordinary reflected light from the mirror. The head and adjoining parts of the male wasp prepared in this way by Mr. Enoch is singularly fine, and a case in point; with the paraboloid beneath the stage, and the side speculum above, a combination of form and colour is seen, of surpassing beauty. The light from the speculum touches the opaque parts with reflections revealing the most exquisite tints of a metallic appearance, while the paraboloid beneath shows, in actual perspective, the wonderful parts beyond in all their natural colour, and bathed in light.

E. T. D.

Crouch End.

A COMPARISON OF THE LAST FOUR SPRINGS.

THE springs of 1879, 1880, 1881 and 1882 have been so totally dissimilar in character that a short comparison of them may not be altogether uninteresting to the readers of this Journal. The spring of 1879 was extremely late; in fact, with the exception of that of 1837, it was the latest this century. It was not until the end of April that the hawthorn showed its leaves, and it was June before its blossoms appeared. On the 1st of June many trees were as bare as in winter, and it was not till the 18th of that month that they were all fairly in leaf. 1880 promised to have a very early spring, but the cold winds of April and May retarded vegetation to such an extent that it was almost as late as 1879, before all trees were in leaf. The process of development of leaf this year was extremely slow.

The spring of 1881 was a direct contrast to the preceding. It began rather late, but the warm weather of May hastened on vegetation very rapidly, and the country, which in mid-April presented an almost wintry appearance, by the latter part of May was clothed in its full summer verdure. The process of development of leaf this year was extremely rapid.

The past spring was as remarkable for its extreme earliness as that of 1879 was for its lateness. By the end of March the country began to present quite a green appearance, many trees being in full leaf. The oak showed its leaves as early as the first week in April, and hawthorn was in blossom at the close of that month (an event which has not happened in these parts, according to returns furnished me by Mr. Orlando Whistlecraft of Thwaite, Suffolk, since the year 1840), and by the first week in May every tree, with the exception of the ash, was fully clothed with verdure. It is a remarkable fact that the earliness of the season appeared to have no effect whatever upon the ashes, which were as late as in 1881, it being near the close of May before their foliage was fully expanded, or about a month later than every other tree. It is to be hoped that the old sayings—

"The oak before the ash
Fills the farmer's pockets with cash:"

or, according to another version—

"Oak before ash,
Only a splash:
Ash before oak,
A regular soak:"

will prove to be true, and that a fine summer is at last in store for us.

The extreme earliness of this season is by no means unprecedented (although it is many years since we had such an early spring) as Mr. Whistlecraft informs me that the springs of 1815, 1822, 1840, 1841, 1844, and 1846 were of a similar description. It will be noticed that the early spring of 1882 followed three years after the late one of 1879, in the same manner as the early spring of 1840 followed three years after the late one of 1837. Whether we are to have a similar succession of early springs, as happened forty years ago, remains to be seen. The following table is from personal observation:—

Vernal indications.	1879.	1880.	1881.	1882.
Crocus blooms	March 19	Feb. 20	Feb. 23	Jan. 12
Hawthorn leaf	April 29	March 9	March 20	Feb. 23
Sycamore leaf	April 21	March 26	April 13	March 12
Horsechestnut leaf	May 5	March 31	April 13	March 16
Lime leaf	May 12	April 3	April 15	March 21
Beech leaf	May 13	April 21	May 1	April 12
Oak leaf	May 27	May 10	May 8	April 5
Ash leaf	June 1	May 15	May 10	May 1
Hawthorn blooms	June 5	May 14	May 22	April 28
All trees in full leaf	June 18	June 9	May 28	May 28

The following returns were furnished me by Mr. Whistlecraft (that of the remarkable spring of 1750 being from notes by the late Mr. Marsham of Stratton, Norfolk, and those of 1822, 1837 and 1846 from Mr. Whistlecraft's personal observation), and is interesting for comparison with the above:—*

Vernal indications.	1750.	1822.	1837.	1846.
Hawthorn leaf	..	March 12	April 25	Feb. 26
Sycamore leaf	Feb. 22	April 2	May 4	March 30
Horsechestnut leaf	March 10	April 6	May 2	March 26
Oak leaf	March 31	April 26	June 1	April 28
Ash leaf	..	April 28	June 2	May 6
Hawthorn blooms	April 13	April 30	June 5	May 1

A. W. PRESTON.

Norwich.

MICROSCOPY.

POLLEN AS A POLARISCOPE OBJECT.—Till the other day I was quite unaware of the fact that pollens could be examined as polarising objects. I happened to have some pollen of Godetia under the microscope with the polariscope on, and found that it polarised quite distinctly, though not in a very marked manner. To make sure that the effect was not due to any other cause, I examined some more slides of pollens and found that some of them, as those of *Centaurea cyanus*, and of the mallow, polarised quite distinctly, though feebly, whilst others, as that of the vegetable marrow, do not polarise at all. The Godetia pollen, which I first examined, was by far the best, but was not so distinct as all but the very smallest starches.—*G. H. Bryan.*

BRAINTREE MICROSCOPICAL SOCIETY.—Nothing could better indicate the rapid spread of scientific investigation and knowledge than the foundation of societies in our smaller towns for the purpose of

* An account of the weather of each year from 1811 to 1882, supplemented by a table of vernal indications from 1819 to 1864, by Mr. Whistlecraft, is about to be published by Messrs. Jarrold & Sons, Norwich.

mutual study. We are pleased to notice the first Annual Journal and Report of the above Society for 1882. From it we learn that papers have been read on "Pollen Grains," by Miss Alcock; on "*Protococcus nivalis*," by Mr. D. R. Sharpe (hon. sec.); by Mr. E. B. Knobel, F.R.A.S., on "Crystallisation," and "The Principles of the Spectroscope;" by Mr. Harrison on "Mounting Microscopical Objects;" by Mr. R. W. Davies on "The Honey Bee;" by Mr. F. R. Row on "Photomicrography." The Report shows a very healthy and highly creditable state of affairs.

The Sign ×.—I cannot find that any microscopist with whom I am acquainted has been either puzzled or misled by the above sign. When a certain figure is said to represent an object × 500 diameters, we can without difficulty ascertain its actual size, and thus be able to compare it with our own specimens; on finding it agrees in outline, size, and the more conspicuous details, we are satisfied as to their identity, and if it lacks the finer structure displayed by our own objective we at once conclude that the one used by the writer was inferior, or that he could not manipulate it to the best advantage. An inch is an inch, although its smaller divisions are not indicated.—*F. K.*

Talc was used by the old microscopists for covering their specimens, but is rarely used now for preparations intended to be permanent; it is sometimes substituted for a film of selenite, and sold with cheap polariscopes, but it is not satisfactory.—*F. K.*

"Studies in Microscopical Science."—(Edited by A. C. Cole, F.R.M.S.) The scientific and artistic merit of these weekly issues, instead of falling beneath the high character they attained at first, have, if possible, improved upon it. To the microscopical student they come as a royal road to learning. Here is a beautifully mounted slide of some object, accompanied by a "Study," written by some specialist, illustrated by an exquisite coloured drawing and a list of works on the subject, together with full and complete instructions to the student how to mount the object for himself. And all for one shilling, including postage of slide and "Study!" Comment is needless, although we may be allowed to wonder how Mr. Cole and his coadjutors manage to do it!

Burrowing Bee.—A burrowing bee which appears in numbers when gooseberry blossoms disappearing before fruit is formed. About a fourth larger than hive bee, and densely clothed with orange-coloured hairs, which in the bright sunshine are intensely red, and cause the creature to look as though it had fallen into a heap of vermilion. Excavates a deep burrow in my lawn. Male smaller than female.—*E. H. R.*

ZOOLOGY.

Pin-tailed Sand-Grouse in Staffordshire.—Some twenty years ago the servant of a relative of mine, who lived near Eccleshall, was out one evening shooting rabbits. When too dark to see plainly, he turned to go home, when a flock of birds flew over his head, into which he fired, bringing down three, one of which he could not find, owing to the fading light, though on going in the morning to look again, he found it, but nearly all eaten by vermin. The birds turned out to be pin-tailed sand-grouse. The two first picked up were stuffed, and I have often had the opportunity of seeing them, and very beautiful birds they are.—*K. D., Cofton Hackett.*

Errata.—Notes on Damping the Pupæ of Lepidoptera, &c.—In the second part of my paper on the above subject (Science-Gossip for September, p. 203), the words *emergence* and *appearance* (sixth and seventh lines from top of page) were, by error, transposed.—*W. J. V. Vandenbergh.*

The Water Spider.—I found a water spider near the end of June this year; it was placed in a jar containing vallisneria. In the night it spun a thin filmy irregular sphere-shaped chamber, which it had filled with air, placing the chamber near the top of the water. When out and crawling about, a fly was placed near the habitation; attracted by its struggles, the spider soon seized it, and after some mauling carried it into its room, pushing it under the bell. Some few hours afterwards it was ejected a shapeless mass. The operation of enlarging the chamber from about $\frac{3}{4}$ inch to 1 inch in length or depth was very interesting to witness. The spider is about $\frac{3}{8}$ inch in length without the legs, and about $\frac{3}{16}$ in width; dark brown, appears black in the water, body appears to be covered with fine short hairs. When in the water, the abdomen and corselet are always covered with a film of air, the total reflection of the light from many parts of it giving it a silvery appearance as it scuttles through the water. After adding a ring of almost invisible film to its room by working inside, it proceeded to fill up with air, which it accomplished by mounting to the surface of the water protruding the abdomen above the surface, withdrawing it with an extra quantity adhering to it. Descending with the bubble, which appeared to be retained *in situ* by the help of the hindermost legs, it next inserted the body under the bell, released the bubble, and mounted for a fresh supply, repeating the process until the bell bubbled over with excess. Once in descending, which was always done quickly, the bubble escaped; something like reason occurred. It paused, thought it was of no use to go back empty-handed, having no load, the burden which acted upon it the reverse way of most burdens having vanished, it mounted for a fresh load, carrying it this time successfully. Some few weeks afterwards it was observed to be busy lining the upper part of the chamber, with a dense texture of snowy whiteness. Here it remained perfectly quiescent for a fortnight, perhaps; when all conjectures were solved and doubts dispersed by the appearance one morning of about twenty small silvery bubbles, each enveloping a minute spider, "the very image of its mother." These wandered about, resting chiefly on the slight deposit adhering to the jar, about an inch above the water. Some I think wandered away from thence, seeking fresh fields and pastures new. Others I transferred to various jars. She (we now drop the it) left her chamber in a few days, appearing to totally abandon it, also refusing food, scuttling away when a fly was offered. Lately she being near the surface, a blow fly was offered; this she seized, fastened it to some leaves, built a fresh chamber, and dragged the fly to the mouth of it. I should recommend vallisneria as the most suitable plant, for one reason, that the habits of the creature can be most easily observed. Another spider in a jar among anacharis, myriophyllum, &c., remains quite shut up and unsociable, having received no large food for the three months it has been with me. The companions of the other have been a newt, snails, small pond leech, and entomostracæ. I have seen no interference of either side.—*Henry J. Bacon.*

Provincial Societies.—We have received vol. ii. part 6 of the "Transactions of the Epping Forest Naturalists' Field Club" (edited by the hon. secretary, Mr. W. Cole), containing the following valuable papers: "On the Origin and Distribution of the British Flora," with an appendix on the river basins of Essex as natural history provinces, by Professor Boulger, F.L.S.; "On the Land and Fresh-water Mollusca of the District around Colchester," by Henry Laver, F.L.S.; "The Mammalia of Essex" (by the same author); "The Galls of Essex" (with 50 woodcuts), by E. A. Fitch, F.L.S.; "Preliminary list of the Hymenomycetal Fungi of Epping Forest," by Dr. M. C. Cooke and Jas. L. English, also the "Transactions of the Norfolk and Norwich Naturalists' Society" (vol. iii. part 3), containing the Address of the President (Mr. J. H. Gurney, jun. F.Z.S.), and the following papers: "A Memoir of Dr. S. P. Woodward," by H. B. Woodward, F.G.S.; "The Noteworthy Springs and Spas of Norfolk" (by the same author); "Notes on Rare Tortricidæ at Merton," by Lord Walsingham; "The Plumage of the Waxwing," by Henry Stephenson, F.L.S.; "Ornithological Notes from Clay," by Frank Norgate; "The Nesting of the Hobby" (by the same writer); "The Lombardy Poplar, and its Destruction in Norfolk," by H. D. Geldart; "Fauna and Flora of Norfolk," part ix., Hymenoptera," by J. B. Bridgman; "The Herring Fishery of 1881," by T. Southwell, F.Z.S.; "On the Occurrence of Sabine's Gull," by H. Stephenson, F.L.S.; "Lists of Norfolk Naiadaceæ and Characeæ," by Arthur Bennet, F.L.S.; "On the Occurrence of the Grey Seal on the Norfolk Coast," by Thomas Southwell, F.Z.S., &c. "The Transactions of the Penzance Natural History and Antiquarian Society" (1881–82) contains papers of the Fauna and Flora of West Cornwall; "The Wild Bees of the Land's End District," by E. D. Marquand; "The Mosses of W. Cornwall," by William Curnow and by John Ralfs; "The Genus Euphrasia and its Forms," by John Ralfs; "The Hepaticæ of West Cornwall," by William Curnow; "The Garden Spider," by E. D. Marquand; "The Economy of the Common Squid," by J. B. Magor, &c. "The Transactions of the Eastbourne Natural History Society" (vol. i. part 2, new series), is a great improvement on its predecessors. We find (among others) the following papers: "Some Peculiar Properties of the Aphis of the Willow," by C. J. Müller; "Notes on Mosses and the Moss Flora of Eastbourne," by F. C. S. Roper, F.L.S.; "Butterflies," by J. H. A. Jenner; "Plovers and the Allied Species," by H. Nicholls, &c. "The Transactions of the Hertfordshire Natural History Society" (vol. ii. part 2), contains papers on "Methods of Preventing Insect Injury," by Eleanor A. Ormerod: "Isaac Walton and the River Lea," by R. B. Croft; "The Gale of the 14th of October, 1881," by Rev. C. W. Harvey; "The Migrations of Birds," by J. E. Littleboy; "The President's Address" (George Rooper, F.Z.S.), &c. "The Proceedings of the Belfast Naturalists' Field Club" (series ii. vol. ii. part 1), always gives copious reports of the excursions made during the summer months to places of interest. In addition to these we have abstracts of papers on "The Boulder Clay of the North-East of Ireland," by S. A. Stewart; "Glacial Notes among the English Lakes," by F. W. Lockwood; "Carnivorous Plants," by W. H. Phillips. The excellent address of the President (Mr. William Gray, M.R.I.A.) is published very fully.

Pachynobia hyperborea.—I was disappointed at not seeing any reference in Mr. Swinton's paper (p. 172 of Science-Gossip), to the moth (fig. 119) figured there in connection with Scarbury. I do not find *Pachynobia hyperborea* in Newman's Moths. A few years ago I bred a moth from a caterpillar found feeding on *Arctostaphylos Uva-ursi.* Perhaps Mr. Swinton would kindly say whether his moth lives upon the same plant.—*J. A. Osborne, M.D.*

Insects Injurious to Forest and Shade Trees.—This is the title of Bulletin No. 7, published by the United States Government and written by the eminent entomologist, A. S. Packard, jun., M.D. It is copiously illustrated by figures of all the predatory insects, in their different stages of development, &c., so that this work is eminently valuable to foresters and horticulturists.

BIRDS OF LANCASHIRE.—Mr. F. S. Mitchell, Clitheroe, has issued a circular to ornithologists, requesting to be supplied with the following information. State boundaries of district in Lancashire referred to. Note whether each species of bird is permanent resident, summer visitor, winter visitor, occasional visitor (summer or winter). Occurrences of accidental visitors, with date, locality, authority, and fullest possible particulars. Which species are found breeding, specifying breeding localities, not necessarily for publication. On the tendency of each species to increase or decrease, with reasons for same. Dates of arrivals and departures of migrants. Whether migration is partial or absolute. Information as to other parts of the county not included in the particular district. Local names and derivations.

BOTANY.

LEUCOBRYUM GLAUCUM.—Var. minus. Will the bryological readers kindly note, that in the brief account of this moss in SCIENCE-GOSSIP for September, the last line but one on page 210 should read "*limited* quantities," and not *un*limited.—*J. Saunders.*

WHITE HEATHER.—White heather (*Calluna vulgaris*), and white heath (*Erica cinerea*), are by no means uncommon on the mountains in counties Antrim, Armagh, and Down, with which I am familiar. I have never rambled across them in autumn without finding numerous specimens of both plants. Last month I was with some friends on a high hill called Bree, between Wexford and Enniscorthy, from which a magnificent panorama of the whole county is obtained, and on which the common heather and ling were in such glorious purple spikes as I never saw elsewhere or dreamed of. One of the ladies of our party got several specimens of white *Calluna v.* and *Erica c.* which she considered "very lucky!"—*H. W. Lett, M.A.*

WHITE LAMIUM PURPUREUM.—In your last number a correspondent mentioned the occurrence of a white *Lamium purpureum* (red dead-nettle). I think this form is rather rare. One was found near York, but before that I had never heard of such a specimen being found. I have never seen any mention of it in any botanical book. I have been noticing variations lately, and the following are one or two of them. In June, while at Harrogate, I found several specimens of *Ranunculus acris* with ten petals, growing in a hedge opposite the Bath Hospital. In May, I found at some ponds near here, a double-flowered specimen of *Cardamine pratensis* (Cuckoo flower). In April, among some specimens of *Helleborus viridis* (green hellebore) I had given, was one with six sepals instead of the usual five. About Easter, I found on a moor a variety of *Lamium purpureum* with the leaves more deeply cut than the common form.—*Alfred Waller, York.*

NOTES ON THE ARBUTUS.—Is your correspondent Mr. John Rasor, who in the April number of SCIENCE-GOSSIP writes on this subject, certain that the arbutus berries considered by the Irish to possess medicinal powers, are not those of the bearberry (*Arbutus Uva-ursi*) which is a very astringent shrub, and was at one time employed by physicians in their prescriptions, as a remedy for various diseases,—in pulmonary consumption, for instance? I know the true arbutus well, have often eaten its strawberry-like berries, and know, though it does not grow wild in Wales, of two old country seats, in whose grounds these trees are not far short of the size of those described by Mr. Rasor, as seen by him at Dinish. I will write and get the exact size of one tree at "Killymamllwyd," in South Wales, provided the tree still stands. It was as tall as the old house when I was a girl, and if it is now living, must, I should say, be sixty feet high.—*Helen E. Watney.*

GEOLOGY.

SUN-SPOTS AND EARTHQUAKES.—Mr. A. H. Swinton, author of "Insect Variety," is preparing for publication a table of sun-spots and earthquake phenomena, by means of which many public calamities may be safely predicted. Any public institution or private individual desirous to assist in the publication of these observations, extending over the Christian era, will kindly intimate the amount of their subscription, for which copies will be sent. The money will be returned unless the expense of publication is fully covered.—Address *Binfield House, Waterden Road, Guildford.*

THE BURE VALLEY BEDS AND THE WESTLETON BEDS.—A paper on this subject was read at the British Association by Horace B. Woodward, F.G.S. After referring to two papers read before the British Association at York in 1881 by Professor Prestwich, the author stated his reasons for concluding that the pebble-gravels of the Bure Valley with *Tellina Balthica* (the Bure Valley Beds proper), were distinct from the shingle at Westleton (the Westleton Beds proper). In company with Mr. J. H. Blake he had (in 1876) traced the latter beds from Westleton to Dunwich Cliff, where they occurred in the upper part of the so-called "Middle Glacial" beds of Messrs. Wood and Harmer. These Westleton Beds, consisting largely of flint-shingle, have been traced from Westleton and Southwold to Halesworth and Haddiscoe. In the neighbourhood of Haddiscoe and Loddon, the author had found evidence to show that this shingle occurred above the Lower Glacial brick-earth (Contorted Drift), and hence that the Westleton Beds could not be of the age of the Bure Valley Beds, which occurred beneath this brick-earth, and (in his opinion) formed the upper portion of the Norwich Crag Series. For the same reason, the Mundesley Beds, which occurred beneath the Lower Glacial Drift on the Norfolk coast, could not be of the age of the Westleton Beds. Nor were the Mundesley and Bure Valley Beds of the same age. The former include the Leda myalis Bed of Mr. C. Reid, which occurs at the top of the Forest Bed Series; the latter are equivalent to the Weybourn Crag which occurs at the base of the Forest Bed Series. Hence the Bure Valley Beds were part of the Norwich Crag Series, and of Pliocene age, the Mundesley Beds belonged to the debateable group of "Pre-Glacial" Beds; while the Westleton Beds were of Glacial age.

THE NORWICH GEOLOGICAL SOCIETY.—The "Proceedings" of this society for the session of 1880-81, just published, contains the following papers: "On the Rootlet Bed in relation to the Forest-bed series of Norfolk and Suffolk," by Mr. John Gunn, M.A., F.G.S.; "On Discoveries of Flint Implements in Quaternary Deposits of the East of England," by Mr. H. Prigg; "The surface Metamorphism of the Eastern Counties," by W. H. Dalton, F.G.S.; "The Lower Pleistocene Strata of England," by Professor Sandberger; "Classification of the Newer Tertiary Strata of England," by H. B. Woodward, F.G.S.; "Evidence of Interglacial Erosion in Norfolk," by A. J. Jukes-Browne, B.A., F.G.S.; Presidential Address "On the Conservancy of Rivers, Prevention of Floods, Drainage, and Water Supply," by J. H. Blake, F.G.S., President.

A NEW FAMILY OF RUGOSE CORALS.—Mr. James Thompson, F.G.S., of Glasgow, has published an extensive and exhaustive paper on this subject, devoted chiefly to a consideration of the genera Clisiophyllum, Cyclophyllum, and Aulophyllum, illustrated by six plates of longitudinal and transverse sections of the corals described, executed in the highest degree of artistic finish and scientific accuracy combined, besides one exquisite coloured plate restoring Cyclophyllum to what Mr. Thompson conceives was the external appearance of the polyp when alive with its tentacles expanded. The descriptions of all the corals are very exhaustive, and this paper cannot fail to enhance Mr. Thompson's reputation as one of the best authorities on the subject of carboniferous fossil corals.

GREEN FROGS.—Can any of your readers tell me the way to keep green frogs alive through the winter, without having to catch flies for them. What other food can they be fed with?—*Ellen Jane Warre.*

NOTES AND QUERIES.

SNAILS NEAR LONDON.—In confirmation of your correspondent's opinion as to Caterham Valley as hunting ground, I may say that on April 9 last, within ten minutes' walk of Caterham Junction, I took *Helix lapicida, hispida, rotundata, hortensis, rufescens, hirsuta, Vitrina pellucida, zonites, celarius, Cyclostoma elegans, Bulimus obscurus.* It is also a famous place for *H. pomatia*, it being found in all parts of the valley.

LAND SNAILS.—If Mr. T. Roberts will send his address to 10, Aulay Street, Ossory Road, S.E., I shall be most happy to give him any information I possess, or, if he would prefer a visit, he would be most welcome to any duplicate specimens of salt and fresh-water shells mostly secured in the neighbourhood of London. Allow me to call the attention of amateur students of the British Mollusca to our Society (the Lambeth Field Club and Scientific Society) which is devoting special attention to this most interesting branch of Natural History. The papers which have for the last three months appeared in SCIENCE-GOSSIP, the subject of which was "Water Snails, a Study of Pond-life," were written by one of our mmembers. My colleague, Mr. Rowe, favoured us with his lecture, August 14th, "Introduction to the Mollusca." I would also suggest the desirability of forming an amateur society in London, which should have for its special object, "The Mollusca, recent and fossil species."—*A. Loydell.*

PLANORBIS CORNEUS.—Watching my aquarium, the other day, I happened to see a specimen of this mollusk seize a larva of *Agrion virgo* (one of the dragon-flies) towards the thoracic extremity of the abdomen, and by continued pressure of the sharp edge of its shell against the glass, cut the larva in two, in spite of its strenuous efforts to escape. Having done this it apparently set to work to eat it. I lost sight of it then, but this morning found the empty integuments of the unfortunate Agrion floating on the surface. Has such a circumstance been observed of this or other freshwater mollusks before? —*P. S. Taylor.*

THE TENANT OF A SNAIL SHELL.—A year or more ago I found an empty snail shell, but is it hardly correct to say "empty," or "snail-shell," for it had an occupant, and that occupant was not the snail, but a curious little thing that rolled out when the shell was shaken? I suppose it had "lived and loved" and perhaps died alone, for I do not think it was alive when I found it. At first I thought it a seed, and intended planting it, when its curious little legs caught my attention more closely to it. Two oval plates, the one more convex than the other; numerous legs protruding from under the armour-like covering, which is very hard. The colour is bluish-grey, something like what we call a woodlouse which I thought it at first was; it is something like a trilobite, I have seen on the Wren's nest limestone. I have looked in Goldsmith's "Natural History," and in Wood's "Insects at Home," but cannot find out what to call the strange animal. Please write and say what you think I must call it, and in what collective place.—*M. Thompson.*

HELIX POMATIA.—Can any of your readers inform me of a locality near London for *H. pomatia*?—*Arion.*

SCIENTIFIC PROGRESS IN HERTFORDSHIRE.—I notice that my friend Mr. B. Piffard has contributed to your pages, under the above heading, a short account of the neighbourhood of Hemel Hempstead, together with a few botanical and entomological notes connected with the locality. All who are interested in natural science must view with unqualified satisfaction the formation of local scientific societies. It is evident that the Hemel Hempstead Natural History Society has already done good work, and I heartily congratulate its members on the measure of success that they have been able to achieve; but surely in taking a survey of scientific efforts connected with our county, the society that initiated the movement, and which appears to have suggested the formation of both the Luton and Hemel Hempstead societies, is worthy of some little acknowledgment. Mr. Piffard, who is, I am pleased to add, one of its members, alludes to it in the following words: "At Watford also there is one, *with the title* 'The Hertfordshire Natural History Society and Field Club.'" the italics are my own. May I be allowed to supplement Mr. Piffard's article by giving a few particulars respecting the society thus mentioned? The association at present known as the Herts Natural History Society, &c., was established under a local name, at Watford in January, 1875, and published its first number of 'Transactions' in July of that year. Two years ago, at the suggestion of several gentlemen residing on the other side of the county, it was determined to extend the area of its operations and to adopt the present title. Since that date field meetings have been arranged in all parts of the county, and ordinary meetings have been held at Hertford, Ware, and St. Albans in addition to Watford. The society is now issuing its fourth volume of Transactions; the numbers already published containing valuable papers by Mr. John Evans, D.C.L., Mr. J. Gwyn Jeffreys, LL.D., by Professor Morris, Mr. J. Logan Lobley, Rev. George Henslow, Mr. J. E. Harting, Miss Ormerod, and many others. Meteorological and phenological information has been collected from every division of the county and has been carefully collated by the editor. The geological features of the district have been zealously investigated. An ornithological register, recording the arrival and departure of migratory birds and the occurrence of rare and accidental visitants, has been regularly kept and notes on its contents annually read. Entomology and botany have obtained their full share of attention, and in order to encourage the study of the latter science, the society is about to publish a second edition of the *Flora Hertfordiensis* (Webb and Coleman, 1849) in which an attempt will be made to give a comprehensive account of the flora of our county corrected to the present time. In completing this arduous task, Mr. Piffard's assistance would be most valuable, and I hope that he will be willing to give to the committee, under whose care the publication of the volume is placed, his cordial co-operation. I do not wish, in the smallest degree, to depreciate the efforts of the Hemel Hempstead Society, but I hope I may be allowed to vindicate the right of the society with which I am so intimately connected to the title it has assumed.—*John E. Littleboy, V. P. of Herts Nat. Hist. Society, Watford.*

"HAY-FEVER."—After partaking of fish I am visited by a severe attack of hay-fever, generally about an hour after. Salmon and mackerel, however I have eaten lately without any such effect, but a day or two ago, after eating part of a whiting I had the worst attack I ever remember having. Breathing was very difficult; in fact I felt nearly suffocated. This was accompanied by swelling over the eyes, between the eye-brows and the eye-lids. This last symptom I have never had before. A friend of mine has hay-fever after smelling a rose. I can understand this a little, but do not see how it is that it occurs in my case. Can anyone explain this?—*C. Fred. Worters.*

HEN CANARY SINGING.—In further answer to Stuart McB.'s query, I learn from bird fanciers and bird breeders that it is not unusual for hen canaries, and in fact hen birds in general, to sing; but the note of the female bird is usually far inferior, both in tone and power, to the note of the male bird.—*Clara Kingsford, Canterbury.*

UNEXPECTED GUESTS.—The bees, from what I can make out from Mr. W. M. C. C.'s description, are imagos of the great saw-fly (*Trichiosoma lucorum*). The larva is mostly to be seen at night or just about dusk, feeding on the hawthorn hedges; they are of a greenish white, covered with a kind of bloom, and exude a peculiar-smelling liquid when handled. When full fed the larva spins a hard and compact cocoon, which it fixed to a hawthorn twig. It stays in the larva state inside the cocoon throughout the winter, and turns to a pupa in the spring. I have bred two species of Ichneumons from this sawfly, *Ophion obscurus*, and a smaller species with a red and black abdomen. I do not know its scientific name.—*Trichiosoma lucorum* is very abundant in the neighbourhood of Birmingham, and the cocoons can be gathered by dozens off the leafless hedges in winter, when they are more easily detected.—*P. T. Deakin.*

UNEXPECTED GUESTS.—The insects produced from the cocoons found by your correspondent W. M. C. C. were not "bees," but the hedge saw-fly (*Trichiosoma lucorum*). The cocoon and larva of this saw-fly bothered me not a little when I first began to collect moths, as the caterpillar is much like that of a moth, but may be readily distinguished by its having twenty-two legs, the caterpillars of moths and butterflies never having more than eighteen. It may be found through the summer months, till the end of August, and will be one of the first captures if the bushes be smartly beaten with a stick and an open umbrella held underneath. It has a red head, with a whitish-green wrinkled skin, dotted with minute glandular elevations. It has a habit of coiling itself in a ring, with its tail in the centre, and is a fat well-to-do looking caterpillar. When irritated, it causes a whitish fluid to exude from its body, and probably this will prevent its being snapped up by a hungry bird from some offensive property attaching it, or, it may be that it is to prevent its being scorched by the heat of the sun, there being little shelter in a thorn bush during the heat of the day. The caterpillar attaches the cocoon, which is a stiff pasteboard case, with rounded ends, and so hard that it will almost resist a penknife, to a twig in the hedgerow, and when the leaves drop off it may easily be seen. The caterpillar lies dormant in the case during the winter, and turns into a chrysalis the following April, remaining in that state two or three weeks, until it emerges from the cocoon by biting a round trap-door at the top of the case, leaving a little piece uncut, to serve as a hinge. If the cocoons are taken indoors early in the winter, the insect comes out much sooner, owing to the increased warmth. The old shells of the cocoons are very firmly fastened to the twigs, and often remain on the bushes two or three years, and form a snug retreat for stray beetles, spiders, and other insects.—*R. Standen, Goosnargh, Lancashire.*

LARGE SLUG?—A magnificent slug, beautifully speckled, and looking so like a snake when fully extended that the first time I saw one entering one of my hives I mistook it for the tail end of an adder. Ground colour, greyish-brown spots, rich dark brown approaching black, symmetrically disposed. Length four and a half to six inches. One I measured a few days since exceeded six and a half inches. Girth less than great black slug.—*E. H. R.*

QUERY AS TO INSECTS.—Your correspondent W. M. C. C. asks information with regard to the name of an insect bred from cocoons, resembling those of an eggar moth and producing a fly he takes to be a bee. There is an Hymenopterous insect of the family *Tenthredinidæ*, genus *Trichiosoma*, figured in Curtis's "British Entomology" that about suits his description. Of one species of this genus, namely *Trichiosoma lucorum*, Curtis writes: It is very abundant upon the white thorn, and in the winter when the leaves have fallen off the cocoons are easily collected, and in April following the fly will make its appearance. To this I add, that the cocoons may be well mistaken for those of an eggar moth, so unless his insect is one of the rare species of the genus he may safely assume it to be *Trichiosoma lucorum*. I have bred it myself and seen it flying over the sallow blossom.—*B. Piffard.*

WASPS STALKING GRASSHOPPERS.—Whilst walking in a field full of grasshoppers, Aug. 25th, I noticed a wasp flying about in a premeditated way, and as if full of some deep design. I watched it, and found it was hunting grasshoppers. It failed in catching two or three, but presently pounced on a small specimen which was clinging to a blade of grass, and mounting on its back calmly proceeded to saw off its head, afterwards its legs, finally flying away with the body towards the nest in the corner of the field, of the existence of which I had been previously aware. I brought in the head, which together with the legs remained clinging to the aforesaid blade of grass. Is it a common occurrence for wasps to hunt their prey in this manner? I am aware that they are carnivorous insects, but I have often seen wasps on window-panes with house flies and others and they never appear to touch them. Perhaps some one of your numerous correspondents would kindly inform me on this matter.—*John P. Smythe, Devonshire.*

ANTS.—On August 1st, while I was waiting for a train at a certain small town in Buckinghamshire, I walked down a country road to see if I could obtain any insects, and found what I supposed to be at first an ants' hill on a bank, but it turned out afterwards to be two ants' nests close together; one sort was a large black ant, and the other a small light brown ant. As I turned over the earth with my stick a severe battle ensued, the black ones coming off victorious. It seems curious that two species of ants should have their nests so close to one another and then fight against each other directly they were disturbed. I should be glad to hear if any of your readers have ever met with the same thing, and whether it is of common occurrence.—*F. H. Parrot, Walton House, Aylesbury.*

WATER SPIDERS.—Very many thanks to Mr. S. Kent for his kind note, and when I again find any more water mites, I shall make another trial to keep them—I have always failed. There were plenty of the large red, and another darker kind in the stagnant part of the New River in White-webs, Enfield, which, I believe, is well known to Mr. Kent. It is a capital hunting ground in the spring, yielding many beauties of creation. My query refers to the *Argyroneta aquatica*, or true water spider. They generally decline flies, and I am afraid mine are now dead, for I do not know what has become of them.—*John Alex. Ollard, F.R.M.S., Enfield.*

WATER SPIDERS.—Your correspondent must keep his water spiders in a vessel separate from fishes, especially sticklebacks, or they will soon be destroyed. A tolerable-sized plant of some bushy water weed, as *Anacharis alsinastrum*, ought to be kept in the vessel with them, as they have to ascend to the top occasionally to renew their supply of air. If he is fortunate he will, as I once did, have the pleasure of seeing them construct their curious bubble-like nests amongst the leaves of the plants. It is very amusing to watch them fetching air from the surface and filling their subaqueous homes. They live, I believe, on small flies, &c., which fall on to the surface of the water, but I never saw any of those I have kept eat anything at all.—*R. A. R. Bennet.*

HUMBLE BEE'S NEST IN A GREASE POT.—While on a visit in August 1882, near Enniscorthy, co. Wexford, I was shown a nest of the small common buff-coloured wild bees in a very strange place. In a large farmyard, entirely surrounded with buildings, is a stone stair to one of the lofts, and beneath the steps is an opening left in the masonry where odds and ends of iron and old horse shoes are thrown. In this spot had been placed, some weeks before, a small preserved food tin half full of cart grease, and in the can on the grease was a humble bee's nest as large as they had room to build it, formed of bits of light hay and straw, all of which must have been carried up from the cattle litter of the yard. The bees were numerous and evidently greatly displeased when their novel hive was lifted out and shown to visitors.—*H. W. Lett, M.A.*

LARGE VIPER.—A few days since (July 17th, 1882), whilst driving in this neighbourhood, my wife pointed out to me a snake which, alarmed by the passing vehicle, was endeavouring to wriggle its way to the top of a heap of manure by the roadside. Upon killing the creature I found it to be a female of the common viper (*Pelias berus*), which measured, when headless and fully extended, no less than thirty-two inches in length. Allowing about two inches for length of head and neck cut off, it measured, therefore, nearly a yard long. I have killed many vipers in various parts of the country, but never before dispatched one of so great a length. You may, perhaps, consider it worthy of record in the pages of SCIENCE-GOSSIP. Upon dissecting the creature I found that it contained eighteen nearly mature eggs.—*Edward H. Robertson, Swalcliffe, Banbury, Oxon.*

SINGULAR REPTILES.—Allow me to give you some interesting particulars about a reptile newly arrived in France. Professor Léon Vaillant, manager of the Reptiles' Menagerie at the "Jardin des Plantes" in Paris, has just made the acquisition of a very curious animal, presenting the strangest physiognomy. It is a great lizard, a native of Central America, bearing the name of "Tuberculised Iguane." In the regions where it inhabits, its flesh is considered as a dainty, and it is hunted with activity. Though of ferocious-looking appearance, it is a very inoffensive animal; its only defence is its tail, which it uses like a whip. The agility which it displays for climbing up the trees renders its capture difficult, so much the more that its coloration of a leaf-green does not permit to perceive it easily. It feeds on plants, and there has not yet been found in Europe food for its sustenance. It stays all day long perched on a tree, seeming to deplore its captivity. I enclose an engraving, showing you the animal on its tree.—*E. Lefèvre*, 35, *Place des Marchés, Rheims, France.*

NOTES ON FLOWERS.—Referring to I. Snell's note on "White Flowers" in "Notes and Queries" for August, I have seen white forms of *C. scabiosa* and *C. nigra* in profusion on the N.E. coast of Norfolk. One stem of *C. scabiosa* bore inflorescences whose central florets only were bleached, the outer speading ring having the usual carmine tint. A. Kingston mentions in "The Wild Flowers of 1882" (September) that *C. oxyacantha* flowered with him in the last week of April this year. It may not be generally known that at the entrance to Hyde Park Gardens, opposite Stanhope Terrace, a fine May tree was in flower on the 12th of April last. Readers may like to know that a flora (though a very imperfect one) of "Cromer and its neighbourhood" has just been published by a resident collector. The worst part of the book is the carelessness with which it has been set up, mis-spelt words abounding on every page, such things as *Bursa pastoris* (instead of *Capsella b. p.*) are also frequent. It however gives a good idea of the unique wealth of this locality.—*E. G. H.*

WHITE FLOWERS.—I have seen a large patch of *Geranium pyrenaicum*, the blossoms of which are pure white, and appear year after year on a country road near Ipswich. A white blossom of the *Lamium purpureum* was brought to me some time ago and we have found several plants of the *Agraphis nutans* and also of the *Campanula rotundifolia* quite white. I found a white *Scilla autumnalis* in Jersey two years ago. Every flower seems to be subject to the same change in colour, and I should like to know the true cause of it. I find every year a patch of the *Chelidonium majus* with double blossoms, whilst plenty of the same plant round the spot is single. How can this be accounted for? The *Saponaria officinalis* occurs both double and single in large quantities, and in several fields and hedges far separated from one another, and some distance from any dwelling.—*C. E. J. G.*

WHAT BIRD?—A correspondent of SCIENCE-GOSSIP lately inquires what bird, and I think I can answer. On the 25th of July last, just outside this library window, believe me, there sat on the top of the apple-tree a bird sufficiently mysterious in his actions to have been the king of Persia named Beder transformed by the inhumane Giauhara. He sat there and chirped, with all the monotony of a spinning wheel. As far as I made out it was a very ordinary large-beaked finch, with a stripe on its wing. Maybe it was the greater redpole (*Fringilla cannabina*).—*A. H. Swinton, Guildford.*

NAMES WANTED.—Will some of the many readers of SCIENCE-GOSSIP kindly furnish me with the names of the following? A small, plain-plumaged bird, about a third less in size than the common sparrow; head, back, and wings dull brown; throat, breast, and under side generally brownish-white; bill slender, and somewhat rising from base; insectivorous, taking its station upon post, rail, or stake, and darting thence upon passing insects. Sometimes rising to the height of two or three feet, at others poised in air before a shrub, or over long grass, catching flies, &c., with a snapping sound, returning immediately to its station. Note generally somewhat harsh.—*E. H. R.*

THE DOMESTIC ARRANGEMENTS OF SWALLOWS.—In the year 1878, while Messrs. Dyer of Alton were building a new mansion (Tylney Hall) for C. E. Harris, Esq., Winchfield, Hants, a pair of swallows built their nest on the ledge of an iron girder in the drawing-room, the birds having access through the windows. The nest was finished and five eggs laid. But before all the young ones were hatched the workmen had to go into the drawing-room to lath and plaster the ceiling. The work could not be delayed in favour of the feathered occupants of the room. Fortunately, however, for the little strangers, one of the workmen, Mr. T. Kemp, was a bird fancier, and also a bird stuffer. He made a box and carefully placing the nest into it, suspended it from the ceiling by a piece of copper wire. The nest hung about six feet from its original position, the old birds then became very timid, and did not seem at first inclined to take to the box; but their natural instincts soon prevailed. Before however the parents regained confidence, and took to the new spot, the young ones began to get cold, so Mr. Kemp very thoughtfully saved the poor little creatures by warming them in his hands till the old ones resumed their nursing. This they did, notwithstanding the noise of the workmen's hammers, and the usual busy stir in the room. And when the young ones were strong enough, they would sit on the edge of the box to be fed, without heeding the men or their noise. After this brood was flown, the parents turned their attention to a second family, and five more eggs were laid in the box, all of which were successfully hatched and reared.—*J. Boggust, jun., Alton.*

HENS AND HORSEHAIR.—A lady sends me the following facts, asking me to find her an explanation. I feel I can do nothing better than to lay the matter before your correspondents, which I do in her own words. "I chose two fresh-looking eggs from a basketful and had them boiled for breakfast this morning. On opening one, I observed a number of horse-hairs wound round, over, and through the white part. Not much liking the look of it, I put it away, and opened the other, which also had horse-hairs wrapped round it. Six of our family witnessed it. There were seven hairs in one, and eight in the other. each hair was about eight inches long; I enclose some as specimens. None of the other eggs in the basket were remarkable. N.B.— Both eggs were fairly fresh." I greatly regret that I have lost the hairs sent to me; they certainly appeared to be thick, strong horse-hairs. — *C. B. Moffat, Ballyhyland, Enniscorthy.*

CURIOUS CONDUCT OF A DOG.—Mr. H. Geddie in the June number (p. 143) records the curious conduct of a dog on a certain occasion, and asks whether such conduct can be explained by reason or by instinct. It seems to me, however, that this case is not referable either to the one or to the other. When a bird builds a nest, or a spider a web, or when bees construct the beehive, &c, we observe certain means employed for the accomplishment of certain ends. Shelter, protection, capturing or storing up food, protection of offspring, &c., these are the ends in view, and the means adapted thereto are such as we all observe and admire. But when a dog merely objects to stir and walk when he usually does so, or *vice versâ*, we do not perceive any act of intelligence or any exercise of instinct or of reason in their higher operations. The conduct of the dog in this instance may be explained by associations of ideas founded upon or derived from an eminently keen and sensitive faculty of observation. There is little doubt that animals in general, but more especially the domestic species, are well versed in the art of reading the human countenance and of interpreting the full force of human tones, gestures, and sometimes even words. And even when a decided emotion is not fully expressed by, but as it were "hangs about," the master or mistress, these favourite animals can, we believe, thoroughly ferret it out, or scent it in the air. They are excellent physiognomists. They have been accustomed from birth to the society and influence of men, and they keenly observe the ever-changing play of the most expressive organism in creation, viz., the human countenance. We all know the effect of a scowl or of a laugh upon a favourite dog or cat; and the grand secret of taming lions, tigers, &c., is to maintain a firm command over the countenance, ever keeping it in full view of the animal. In the case before us, the special service at church in the afternoon was no doubt productive of that solemn aspect, tone, and gesture among the boys which are so becoming to such occasions. The dog had, we may be sure, watched on several previous occasions their comportment when about to go to church, and had become very skilful in descrying the approach of any unusual emotion, or of a period of organic quietude on their part, such as would be uncongenial to him. Hence he scented something in the air, he readily foretold that the boys were not going to have an outing at that particular time; and the reverse of all this occurred on the occasion of the unusual walk in the evening. So that we may conclude that this school dog, in the case under review, actually acted from impulse, i.e. (to quote from my note in SCIENCE-GOSSIP, Sept. 1879) "from strong special sensibilities directing as it were inevitably the native life-energy," &c. And on the whole, without seeking to re-open the discussion, we may decide that the apparently rational conduct of insects and other invertebrates has been amply elucidated by anatomical researches upon the nervous system; and the wondrous doings of the vertebrata below man in the scale of animal life may be expounded by observation, association of ideas, and imitation. No animal other than man can speak, or does possess the power of thinking about absent objects by means of signs. Hence, general notions cannot possibly be formed by them, and hence reasoning in its higher senses or conscious constructive ingenuity is with them utterly impossible. With respect to the theory that man's moral nature is merely the result of a powerful development of the sensori-motor ganglia, it may be observed that the great enigma of our moral nature is to explain, without resorting to physics and chemistry, the undoubted fact that man can consciously so train his emotions or motives as to subordinate one entirely to another according to his choice. And it is the opinion of many eminent living biologists that "matter and its ordinary forces and properties belong to one category or order; creative power, and will, design and mind ought to be included in a very different order indeed.—*P. Quin Keegan, LL.D.*

SHEEP WORRIED BY A DONKEY.—One frequently hears of sheep being worried by dogs, but I think it is a very remarkable circumstance to find these worried by a donkey. But such a case has really occurred in the village of Hayton, in West Cumberland. A donkey strayed from the village green and got into a field where some lambs were grazing, and worried two of them. I am not aware whether there were any more than those two in the field. The owner of the lambs claimed three pounds as their value, and brought an action in the county court, held at Wigton on the 12th inst. (July), against the owner of the donkey, and there being no question as to the facts, a verdict for the full amount claimed was given by the judge, Mr. Ingham, against the owner of the donkey. I should be glad to learn if any of the correspondents of SCIENCE-GOSSIP have heard of a similar case.—*Dipton Burn.*

NATURAL HISTORY NOTES.—About three years ago, I caught a fine male Apollo butterfly in Devonshire; at that time I did not know its rarity, so I did not take any notice of it; I have it now in my possession; it was sitting on a wild rose, and I easily caught it with my hand, having no net. At least four smooth snakes have been caught this year around Bournemouth; I hope the search will not exterminate them. I have two of them. A white pheasant has been shot in Kent; and I saw a variety of the shrew mouse, which was dark chestnut above, and white beneath. It was so far decomposed I could not preserve it, but it was certainly a shrew. The nest of the hawfinch, three eggs, was taken a month ago in Kent; I hear it is rare in the south of England. Can any correspondent tell me where I can get a live bat, or weasel?—*H. C. Brooke.*

HERONS' NESTS.—Some of your correspondents writes to say the herons sits astride their nest during incubation, but I cannot see the possibility of such a position; having seen a good many nests, not only from a distance but have climbed the trees. I always found them of so large dimensions as to complete upset such a statement; "the nests are seldom under three feet across, and sometimes so large that one cannot reach the eggs without getting on the top, or else tearing down part of the structure;" the same nests will serve their purpose (with additions yearly) any number of seasons, the accumulation of material will sometimes bend a strong tree. Some ornithologists however says the heron builds a small nest to its proportion while others says they build a very large one. I quite agree with the latter, and I think your correspondents have been deceived as to their position when hatching.—*W. Sim, Fyvie.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

W. HAMBROUGH.—Your insect is a species of sawfly (*Trichiosoma lucorum*). See notes on the same in this month's SCIENCE-GOSSIP.

M. G. (Lewisham Hill, S.E.)—No. 1, Brittle Fern (*Cystopteris dentata*, Hook.) a very rare form, and No. 2, *Asplenium Adiantum-nigrum*, var. *acutum*, Bor., also a good find.

J. E. (Steeton).—It is the upper part of a frond of the Shield Fern (*Nephrodium spinulosum*).

T. J. (Whitby).—A very pretty autumnal flower, the Golden Rod (*Solidago Virga-aurea*, Linn.).

J. S. (Bolton).—It is difficult to name fern varieties, the Athyrium however is *A. rhaticum*, Roth; another, *Blechnum depauperatum*. Send them to Mr. P. Neill-Fraser, Canonmills Lodge, Edinburgh, he would be glad to see them.

C. F. W. (Forest Hill).—No. 5, quite correct, 6 is the *Sedum anglicum*; 7 is rightly named; 8, *Polytrichum commune*; 9, *Stachys sylvatica*.

R. R.—(Chadstone).—No. 1, Iceland Moss, 2 and 3, *Parmelia saxatilis*, 4, a species of Cladonia, but they are not in fruit, so are difficult to name with accuracy.

X. Y. Z.—No. 2, an exotic composita, name held over; 3, *Hieracium murorum*; 5, *Viola Curtisii*, Fors.: the latter an excellent find; No. 1 is not a Campanula, see next month.

J. F. (Billingshurst).—We have examined the Fedia you enclosed, but fail to observe any malformation or suppression of parts; being dried of course makes the difference.

W. W. F.—Accept our thanks for double wild flowers of *Potentilla reptans*. We have not see it double-flowered before.

T. S. King.—The object on frond of Laminaria is a young specimen of *Helcion* (*Patella*) *pellucidum*.

K. D.—The flower sent is a species of Calendula, not British, probably imported with grass or other seed.

EXCHANGES.

Wanted, well-mounted micro-slides for unmounted opaque injections, with instructions for mounting same.—M. D., 2 Westbury Gardens, Clapham Park, S.W.

Enthusiast would be pleased to exchange upper silurian and coal measure fossils for other specimens.—106 Finch Road, Handsworth, Birmingham.

Wanted, a complete set of each of the following varieties of eggs, side-blown, with full data: hobby, merlin, stonechat, goldcrest, twite, raven, spoonbill, dunlin, ruff. Other good eggs offered in exchange.—W. Wells Bladen, Stone, Staffordshire.

A quantity of chemicals, &c., for microscopic mounting. What offers?—J. Liddy, 14 Wornington Gardens, Notting Hill, W.

Accumulation of micro-material, especially fungi, for mounted objects, clean diatoms, dried plants, or insects.—G. H. Bryan, Thornlea, Cambridge.

Wanted, impressions (in any substance) of good seals or medals.—W. H. Tunley, Albert Road, Southsea.

Offered, 7th ed., L.C., Nos. 368, 490, 627, 630*b*, 631, 1212, for 23, 28*b*, 48*b*, 50*b*, 101, 1016, and many others. Lists exchanged.—C. A. O., 76 Trafalgar Road, Camberwell, S.E.

Shells for exchange:—*Chemnitzia elegantissima*, *Cardium Norvegicum*, *Anodonta anatina*, *Pisidium pusillum*, Neritina, *Planorbis contortus*, *Physa hypnorum*, &c.; *Helix pomatia*, *H. lapicida*, *H. virgata*, &c.—S. C. Cockerall, Glen Druid, Chislehurst, Kent.

Adams' "Butterflies," Newman's "Butterflies" and "Butterflies and Moths." What offers of Machaon, Podalirius, Apollo, Iris, Hippothoe or Dispar, and Antiopa?—W. H. Scott, Eastwood Villas, Humberstone Road, Leicester.

Wanted, Gray's "British Land and Freshwater Mollusca," Shuckard's "British Coleoptera." Offered, Watson's "Compendium to Cyb. Brit."—W. H. G., 44 Hillmarten Road, Holloway, N.

Mountain or rock gatherings of Desmidiæ desired (British or extra European), in exchange for others, mounted or unmounted.—W. Joshua, F.L.S., Cirencester.

Wanted, vol. 1 of "Natural History Notes."—John A. Ollard, F.R.M.S., Forty Hill, Enfield.

Well-mounted slides, cabinet to hold 500 in 19 drawers, micro works, &c., to exchange for books, &c.—F. S. Lyddon, 2 Oakland Villas, Redlane, Bristol.

To exchange, Science-Gossip, vols. iii., iv., v., vi. and vii., vols. iii. to vi. bound; from 1879 to date unbound; "The Popular Educator," latest edition, now being published, 22 parts. Wanted, books on physics, mathematics, electrical engineering, scientific apparatus, or anything useful.—H. Wager, Middle Street, Stroud, Gloucestershire.

Wanted, British marine shells in exchange for others. *Helix pisana* and *H. pisana* v. *alba* offered for other land shells.—G. O. Howell, 4 Paget Terrace, Lower Eglington Road, Plumstead, S.E.

Mounted or unmounted microscopic objects for good gatherings of *Campylodiscus castatus*, *Meridon circulare*, *Achnanthes longipes*, &c. Liberal exchange given.—W. White, 7 Warden Place, York Street, Nottingham.

E. Wade Wilton, Microscopist and Naturalist, Northfield Villa, Leeds, requires occasional collectors at Dublin, Ilfracombe, Scarborough, Ashton-under-Lyne, in England, at Christiania in Norway, and Berne in Switzerland, for living specimens, the last two for polyzoa and diatoms.

Wanted, "Popular History of British Lichens," by W. Lauder Lindsay, M.D.—Arthur J. Doherty, 21 Barton Street, Moss Side, Manchester.

Duplicates: Gamina, Graminis, Valligera. Desiderata: Adippe, Cinxia, Athalia, Antiopa (Continental), Æsculi, Seriex, Eriseola, Russula, Porata, Osseata, Unguicula, *L. album*, Typhæ, Fulva, Popularis, Puta, Gracilis, Parthenias, Maura, Trapogonis, Lithoriga, Serena, Litura, Upsilon, Minutata, Assimilata, Luteata, &c.—J. Smith, Kilwinning, Ayrshire.

Marine algæ, fine specimens sent on receipt of stamped addressed envelope.—A. J. Doherty, 21 Barton Street, Moss Side, Manchester.

Thirty old prints (1824) of Scotch towns and places of importance for exchange. Wanted microscopical apparatus or books. What offers?—W. E. Watkins, 32 Huntingdon Street, Barnsbury, N.

Ure's "Dictionary of Arts and Manufactures," nineteen volumes of Gmelin's "Chemistry," translated by the Cavendish Society, Darwin's "Origin of Species," in very good preservation. Offers in electrical apparatus or telephone.—Charles J. Heaton, care of Dr. Doe, Pinner, Watford.

Urania Rhipheus (Madagascar), the most splendid lepidopteron known, blazing metallic green, orange, red, and violet, just received from the Bishop of Madagascar, condition superb. Exchange for other exotic lepidoptera; wings of ditto for the microscope.—J. C. Hudson, Railway Terminus, Cross Lane, near Manchester.

Wanted, the "Exchange and Mart," "Graphic," "Illustrated London News," "Pictorial World," and "Punch," posted early, in exchange for scientific publications.—J. C. Hudson, Railway Terminus, Cross Lane, near Manchester.

Wanted to exchange, foreign shells. List of duplicates and desiderata on application.—J. Morgan, 1 Mulgrave Road, Sutton, Surrey.

Wanted, a botanical correspondent in North or South America for the exchange of plants.—J. A. Wheldon, 9 South Street, Scarborough, England.

Wanted, birds' eggs, butterflies, beetles, and insects, generally from abroad, either for exchange.—W. K. Mann, Wellington Terrace, Clifton, Bristol

For exchange, "A Million of Facts," by Sir R. Phillips; correct data and elementary information in the entire circle of the sciences, and the following shells: *Helix cantiana*, *Trochus tumidus*, *Helix cricetarium*, *Natica alderi*, *Trochus cinerarius*, *Venus fasciata*, *Bulimus acutus*, *Tapes Virgineus*, *Cyclostoma elegans*, *Chiton marginatus*, *Venerupis Irus*, *Venus ovata*, *Zonites cellarius*, in exchange for Sir John Lubbock's "British Wild Flowers in relation to Insects," other works or microscopic slides.—Joseph Anderson, jun., Chichester, Sussex.

Wanted, fossils, minerals, and rocks; can offer good exchange in insects.—92 Cranbourne Street, Leicester.

First-class micro-slides and objects sent in exchange for literary works, Shakespeare's (Clarendon series), Thackeray's, Lord Lytton's, Dickens's, and Walter Scott's especially wanted.—J. Tempère, Storrington, Sussex.

BOOKS, ETC., RECEIVED.

"Remote Antiquity of Man not Proven." By B. C. Y. London: Elliot Stock.

"Studies in Microscopical Science." Edited by A. C. Cole. Nos. 15, 16, 17, 18, 19.

"Land and Water."

"Midland Naturalist."

"Northern Microscopist."

"Ben Brierley's Journal."

"American Naturalist."

"Canadian Entomologist."

"Cosmos: les Mondes."

"La Feuille des Jeunes Naturalistes."

"Le Monde de la Science."

"La Science pour Tous."

"Revista."

&c. &c. &c.

Communications received up to 12th ult. from:—P. S. D.—C. F. W. S. W.—T. L.—W. A. G.—W. H. H.—A. S.—A. E. P.—H. C.—G. C.—M. G.—E. A. G. D.—Dr. J. N.—F. R.—K. A. D.—J. S.—A. H. S.—E. W. M.—F. S. M.—A. H. S.—J. L.—G. H. B.—J. F. R.—E. M.—J. S.—C. F. G.—W. H. S.—R. H.—S. G. F. M. L.—W. W. D.—W. J. V. V.—E. G. H.—S. Y.—R. M. O.—W. H. G.—W. S.—W. H. T.—S. C. C.—J. T.—H. H. P.—E. T. D.—H. C.—E. M.—C. F. W.—H. J. B.—G. R.—C. E. J. Y.—W. W.—J. E. S.—J. S.—J. A. O.—H. W. L.—G. O. H.—J. S.—F. S. L.—H. W. P.—E. J. W.—E. W. W.—W. J.—J. B., jun.—N. W. B.—W. W. F.—W. T. L.—C. F. G.—T. S. K.—J. M.—W. E. W.—A. J. D.—A. R. G.—J. C. H.—J. T. M.—C. J. H.—H. G. F.—C. S.—K. D.—W. K. M.—J. A.—J. A. W.—A. H. F.—J. A. O.—&c.

RECREATIONS IN FOSSIL BOTANY.

ASTROMYELON AND ITS AFFINITIES.

By JAMES SPENCER.

[*Continued from page* 205.]

In my paper on "Notes on Astromyelon and its Root," which I had the honour of reading before the Geological Section of the British Association at York, I described two new forms of amyeloid roots, which I then believed to have been the roots of Astromyelon. It must be premised, however, that my reasons for regarding these roots as belonging to Astromyelon are purely physiological, as I have not yet seen the two plants in actual connection. The same may be said of any other root found in these coal-balls. Notwithstanding the fact that hundreds of stigmarian roots have been found therein, yet no one has ever seen one connected with either Sigillaria or Lepidodendron, although elsewhere they have been seen connected together. But there is no safer method of comparing plants than by the histological investigation of their various tissues under the microscope. This is the plan adopted by Professor Williamson in tracing the history of the fossil plants and their relation to one another.

My new plants belong to the order of pithless roots which that author has described under the name of Amyelon. One of these he has named *Amyelon radicans*, which he regards as one of the roots of Asterophyllites, and as this species bears the nearest resemblance to my new forms of any of them, it will be advisable to give a brief description of it.

Amyelon radicans has a solid vascular axis, formed of comparatively large vessels, which are arranged in a radiating manner from the centre to the circumference. These vessels are plain on their tangential faces, but beautifully reticulated on their radial faces. These markings form a characteristic feature of this root. The bark, as is frequently the case, is rarely preserved, but such portions as are met with indicate that it was formed of a rather corky parenchyma. In comparing this root with its parent stem, Asterophyllites, we find that their structure is nearly analogous one with the other, and that the vessels and cells of the latter plant are also characterised by being highly reticulated, and that these reticulations are confined to the radial faces of the vessels and cells, the other faces being plain, just in the same way that they are in the root.

It is from the fact of the vessels in each plant being marked with the same peculiar reticulations, and on the same side, the one facing the medullary rays, that their affinity has been established.

Upon comparing the structure of Astromyelon with that of my new roots, I find that there is a general agreement between them. The vessels and cells in each are generally barred, but there is also another kind of marking which is common to both roots and stems, which is a sort of cross between the barred and the reticulated types; this character may be termed semi-reticulated. These semi-reticulations occur at uncertain intervals among the barred vessels and cells, and, like the markings on the vessels of *Amyelon radicans*, they occur only on the radial faces. One of these new roots is a most peculiar one. It has a solid parenchymatous axis, the cells of which are pretty uniform in size, and are arranged in radiating laminæ in a centrifugal manner. The portions of the bark which are preserved indicate that it was of firmer texture than is commonly the case in such structures. To this root I have given the provisional name of *Amyelon radiatus*.

The most interesting feature about the other root is the bark, which in this root is almost always preserved; but for reasons which I will briefly indicate, I have not thought it advisable to give this root a name at present. I have already pointed out that under the name of Astromyelon a very widely divergent series of plants are comprehended, which may probably have to be divided into two or more species when we have learnt more about them. The common form, with the star-like pith, will form one group; while those with little or no pith, may form another group. In that case, the new root which I have named *Amyelon radiatus* would most probably belong to the former, while the other would agree with the latter group. I am not however, quite satisfied about placing the pithless stems of Astromyelon along with the true "star-like" pithed ones, and it is only because of my inability to draw a dividing line between the two groups that I have done so. It is quite possible that these pithless stems may have been underground stems or rhizomes, and in that case my second roots might simply be their smaller branches.

But whether stems or roots, they are quite new, and I trust of sufficient interest to be brought before you, if only to show you what a wide field there is still open for further researches in this most interesting subject.

I have already pointed out to you that the woody cylinder of Astromyelon bears a general resemblance to that of Calamites. I wish now to draw your attention to the structure of Asterophyllites. The beautiful forms of this plant have long been known to collectors of fossil plants. It derives its name from the fact of its long narrow leaves being arranged in whorls at intervals along the stem, in a star-like manner. The highly specialised character of the tissues of this plant was unknown until a few years ago. It was for some time regarded even as the young branches and leaves of Calamites, along with Sphenophyllum and Annularia. But the discovery of its stems in our coal-balls has shown that it is an independent genus.

In the French coal-fields Sphenophyllum has also been found, with the structure preserved, and its structure is found to closely resemble that of our Asterophyllites. But up to the present date neither Sphenophyllum nor Annularia have been recognised in our coal-balls. A single glance at the structure of the transverse sections of Calamites and Asterophyllites will be sufficient to show how widely they differ from one another. In Calamites the woody cylinder is composed of an indefinite number of wedges, varying from eleven to sixty or more, according to the size of the plant. But in Asterophyllites there are only three large ones, and this number never varies, being the same in young and old alike. But there is a much greater difference between the two plants in the form of the pith, which, as I have already pointed out, is fistular in Calamites, whereas, on the other hand, the centre of the stem of Asterophyllites is seen to be occupied by a remarkably characteristic pith, which is triangular in form and is composed of vascular tissues, like the pith of Lepidodendroid plants. From each of these angles is given off a woody wedge, which are very small in young plants, and the spaces between them are filled with parenchymatous tissues; but in older stems these wedges increase in size, until they form a solid cylinder. The general character of these wedges is the same as those in Calamites and Astromyelon. But the structure of the bark is different from that of either of the latter plants. The cells are square or oblong in form, and have thicker walls, which accounts for their being generally more or less preserved. Then again, the stems of Calamites are strengthened internally by the intercrossing of the wedges at the nodes; whereas the solid pith of Asterophyllites is continuous throughout the stem, and there is an external swelling at each node where the leaves and branches were given off. We need scarcely add that stems possessing such differences in structure as these do could not possibly belong to one and the same plant. Moreover, Calamites with branches are not unfrequently met with, and the structure of these branches is identical with that of their parent stems.

From the foregoing brief account of Astromyelon and its allies, it will be seen that while there are many points in which they differ widely from one another, yet in regard to the most important part of their structures they are bound together by the most intimate ties of relationship. The woody wedges of the ligneous zone in each of the three genera are constructed on the same plan, and formed of the same kind of tissues. In each genus the wedges or bundles are open, and as the plants increased in size they also increased in size by the addition of new cells and vessels in a truly exogenous manner.

It is also important to bear in mind the fact, that although the great majority of our coal-ball specimens in each genus belong to small herbaceous plants, yet there is abundant evidence to prove that a large number of plants attained to arborescent dimensions. These facts have an important bearing upon the great question of evolution.

Though forming part of the great group of Cryptogams, yet they have had many affinities with the fossil pines of the same age. The mode of growth and construction of the ligneous cylinder is homologous with what obtains in Dadoxylon and in Lyginodendron, while their scalariform and parenchymatous tissue are homologous with similar tissues in the Lepidodendroid plants.

Our interest in these pretty plants is not yet exhausted, for only so recently as the last few months some interesting discoveries have been made in connection with them. Hitherto the bark of Astromyelon has neither been described nor figured; it proves to be a most beautiful structure, even among the magnificent flora of the carboniferous age. I hope to return to this subject at some future time, and to describe this new feature of Astromyelon.

Halifax.

THE COMMON GUILLEMOT (*URIA TROILE*).

PERHAPS, after perusing the following, your readers may be inclined to think I should rather have applied to mine, its other well-known sobriquet of foolish guillemot! The bird came into my possession under the following circumstances:—Some fishermen had their lines out at the mouth of Peel Harbour (I. O. M.) about mid-day of 24th of May last. Large whelks or "buckies" formed the bait. Many birds were engaged in the same pursuit, each in its own manner. The guillemot swimming below may have been attracted by the bait, or perhaps by a small fish that had just swallowed the bait. Certain it is that the fisherman was surprised when he drew in his line to discover a bird when he looked for a fish! She was given to me, and I took her to Ramsey the same day.

Very wild she was, and very ready to make use of her strong sharp bill. I was able to get some fresh gibbons, or sand eels, which she enjoyed. In three days she was sufficiently tame to come to me when called, and to eat out of my hand, and would let me stroke her or carry her without biting my fingers. I thought if she were put into water she would dive; but though I tried fresh water and salt, and though I threw in some glittering gibbons, she would not put her head under, but struggled out immediately. Her short wings did not permit her to fly, and even when I allowed her to fall from a height of a few feet she dropped heavily on her breast. She was allowed to run about as she pleased, but when let out always wanted to get back to her house. She seemed greatly to dislike the sun, and when wet preferred to preen her feathers in the shade, rather than dry them in the heat of the sun. If she could not get gibbons (and she would only eat them if they were fresh), she would be satisfied with raw meat, the more juicy the better. I tried whiting, but she would only eat it if cut into small pieces; once she was persuaded to eat a large earthworm, but only once; a snail also was taken, but a second refused, nor could I persuade her to eat bread.

In a very few days she had grown so tame as to come into the house, and disliked to be turned out. If placed upon anything that was raised, she would let herself fall off, fluttering her little wings, and coming down heavily on her breast. Her claws were sharp and very strong, and I could see how useful they would be to her in climbing up the steep rocks out of the sea when she would be going to roost; the wings also helped her greatly in climbing, and the tail slightly. In moving from one place to another she wabbled in a ludicrously solemn manner, setting the whole metatarsus on the ground at each step, but sometimes, and especially after a bath, she would move more quickly, resting only the palmed foot on the ground, and sometimes she would try to raise herself higher, by standing as it were on tip-toe, resting on the extreme joints of her toes.

About a fortnight after her capture I was sitting one evening alone in the house; "Gillie" had just been fed, and was comfortably sleeping before the kitchen fire, with two drowsy dogs for company. After some time I heard curious noises on the staircase, and, at once divining the cause, opened my door. Gillie was coming to pay me a visit; I took no notice of her as she came slowly wabbling into the room, straight to my feet, as a dog might do. Then she took a survey of the premises, till I lifted her on to a window-sill. She could not understand the glass, and pecked it savagely; this amused her for some time, but growing tired of it or wishing to attract notice, she got from the window-sill to my bureau, and placing herself in the midst of some loose papers began to prune her plumage and clap her wings with an air of great satisfaction. I could not trust her here for long, however, so set her on the stairs again; the descent was not so easy, and she had to flutter down.

After this I kept her in a house with a merlin and a young peregrine. The little merlin perched on a peg driven into the wall, and rested on one foot, holding up the other, almost buried in the soft feathers of her breast; the peregrine sat on the top of a hamper, her flabby feet sprawled out and seemed with difficulty to support her big body; the guillemot chose the darkest corner, and lay on the ground behind the hamper. At night I frequently found her roosting as a duck would do, with her breast on the ground; sometimes, but very seldom, she would lie so in the day-time, and I should suppose these birds hatch their solitary eggs in this position, and not as I've seen stated in print, by sitting upright over them! When Gillie had been three weeks in captivity, I thought she should be allowed her liberty, for, though very tame and apparently contented, I felt she must miss the sea. I would have taken her away to the rocks, but the weather prevented, so I carried her one morning to the end of the breakwater. I set her on the rail, stroked her and bid her farewell. She gave a good look all around, then, stretching her wings, she let herself drop, fluttering rather than flying out to sea, her black feet stretched out behind her, gradually lowering herself till her breast touched the water. Then swimming out slowly she soon had some gannets to keep her company. In about twenty minutes I turned for a last look at her, and was surprised to see her coming back. She certainly was coming back, and increased her speed as she approached, swimming, I thought, in rather a jerky manner, taking advantage of the waves. When within hail, I called to her, and going to the harbour side of the breakwater, whistled and called. She appeared to recognise my call, and came swimming up the harbour alongside the breakwater as a dog might do at the bid of his master. As I was walking along, above her, I could plainly note her movements. Paddling with her feet, she used her wings as a man would his arms in swimming, driving the water before her in foaming wavelets. She floated low in the water, the head, neck and upper part of the back

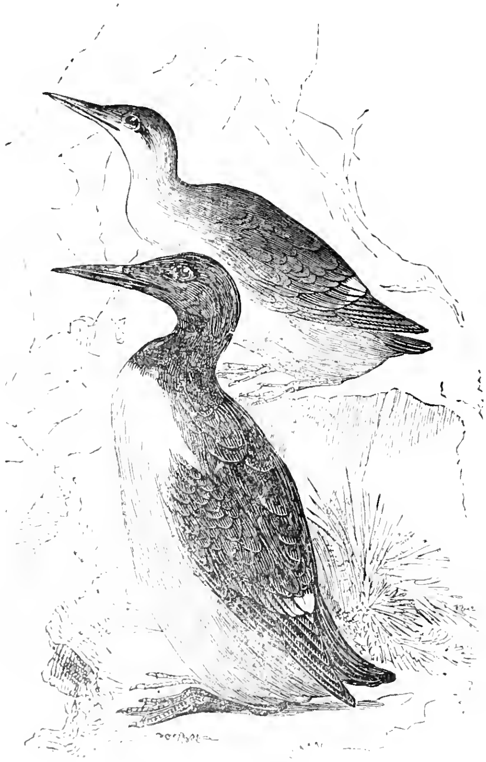


Fig. 167.—The Common Guillemot *(Uria Troile)*.

being alone visible. When half-way up the harbour, she took it into her head to try and land on the breakwater, but there was rather a surf, and the timbers of the breakwater were steep and exceedingly slippery; taking advantage of an incoming wave, she clung to a beam with her strong claws and beat hard with her small wings to keep her position, but, before she could get a purchase, another wave had come, and lifting her off the beam, returned with a rush bearing her down with it; several times this occurred alternately, she was washed up and dragged again into the water; at last a back flowing wave deposited her between two great beams, her wings thrown back. Before she could settle herself a wave came over her, and for some seconds she was feet deep in the water. She seemed fairly caught, another and another wave came, and as each retreated it seemed as if it must break her wings. I began to fear she would be drowned, or her wings broken, and thought to jump in to her rescue, but just then she got free. Nothing daunted, she again attempted to land, but at last gave over and swam out into the middle of the harbour. At the end of the breakwater, I got down to a little shingly beach, and called and whistled and held out my hand coaxing and encouraging my poor Gillie. She came along right up to me and landed at my feet. I petted her and stroked her, and letting her go a bit up the beach she gave herself a good shake as a dog might do. After this, what could I do but carry her home again? So I carried her home again; she seemed quite tired, and appeared glad to get back. She soon refreshed herself with some nice raw liver, and I was pleased to hear her utter her curious indescribable croak, resembling somewhat that of a cormorant, but not so prolonged.

The morning was gloomy, and there was an inshore wind; this may perhaps partly account for her speedy return. I was myself pleased with the incident, and thought this little narrative might be of sufficient interest to deserve a place in a magazine devoted, as its name implies, to SCIENCE-GOSSIP.

I have called my bird a common guillemot; perhaps she better deserved the other title, for which at all events there is an excuse. Foolish Guillemot! Why did you return to me? Why am I now obliged to add a mournful postscript? I fear she was injured by the cruel waves. But why come back to me to die, poor bird? I look at you in your case of glass and half imagine that you still live. Your life has not been useless, and you shall not be forgotten.

PHILIP KERMODE.

Ramsey, Isle of Man.

THE DIASTOPORIDÆ: OR THE NATURAL HISTORY OF A FAMILY TYPE.

By GEORGE ROBERT VINE.

[*Continued from page* 147.]

IN one of Mr. Waters's earlier papers,* he describes and figures (sp. 38, figs. 13, 14) a very peculiar type of Diastopora. The zoarium is disk-like, but also, as being shaped like a cup, with a thick undersurface which is marked with concentric lines, and is composed of three or four layers of cells. The cells are sunken or immersed, but free at the distal part. This habit of colonial growth is not peculiar to this species alone, for as we shall see, many of the earlier Diastoporidæ participate in the same habit.

* Read before the members, and published in the "Transactions of the Manchester Geological Society, 1878." 'Bryozoa,' from the Pliocene of Braccoli, Sicily.

The species is named *D. cupula*, and Mr. Waters identifies the Tertiary type with the Cretaceous type of D'Orbigny. As only one specimen was found by the author, it is impossible to say whether this habit is a varying or a constant one, but the identification may be safely relied upon, and the identity is so far valuable as regards colonial growth, but no farther.

In Dr. Manzoni's work on the Bryozoa of the Pliocene of Castrocaro (Pl. vii.) three types of Diastopora are given, one of which is doubtfully referred to *D. patina*, Lam. (?) as occurring in a fossil state frequently at Castrocaro, and as living in the Arctic and Boreal seas; another as *D.* (Berenicêa) *striata*, J. Haime, a Jurassic fossil form, and the other as new, which is

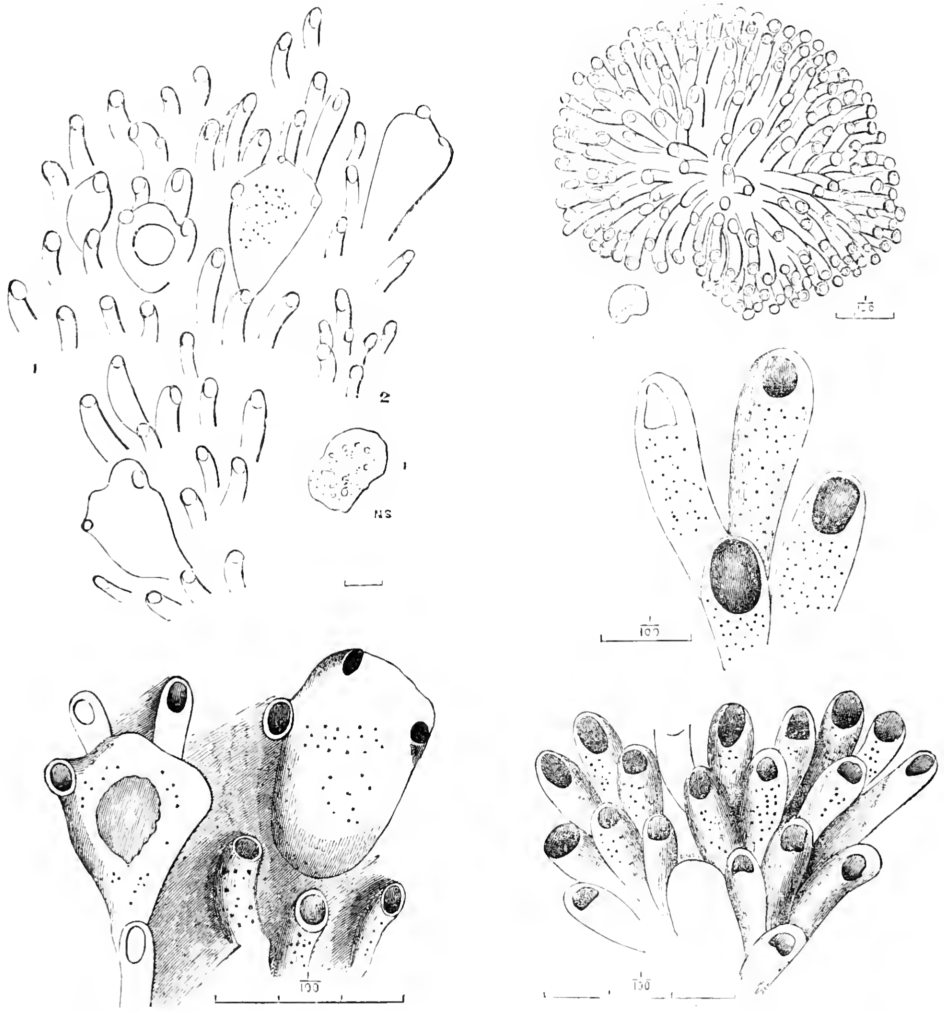


Fig. 168.—Types of Oolitic Diastopora. 1, 2, 3, *Diastopora ventricosa*, Vine; 4 to 7, *Diastopora oolitica*, Vine.

Mr. Busk, in his Brit. Mus. Catalogue, Pl. iii. "Cyclostomata," had previously described and figured a species, discoidal and cup-shaped, which he identified as the *D. congesta* of D'Orb. In this a secondary disk arises from the surface of the primary one, the true meaning of which is that in the colonial growth layer after layer of cells may eventually succeed each other till from a tiny speck the habit becomes, in a sense, massive, rather than merely discoidal. It is well to note this feature.

described as *D. expansa*, Manzoni. The last species forms very large expansions, and the cells are contiguous, and in the portion figured (Pl. vii. fig. 83) they are in lines. It is but just to the author to say that he is doubtful as to whether the species should be placed with Diastopora.

In the "Crag Polyzoa," Mr. Busk seeks to establish as a distinct type the Mesenteripora of Blainville, and describes and figures a species which he names *M. meandrini*, S. Wood. In this type the zoarium is foliaceous, and the "cells are in two layers parted by a calcareous septum and opening on both surfaces." * In the "Ann. and Mag. of Nat. Hist.," vol. xiii., Mr. Wood had called the same species *Diastopora meandrina*, but in this species Mr. Busk draws attention to a remarkable feature when he says, "As in several other Cyclostomata, more especially of those belonging to the present family, the mouths of the tubes in this species are eventually closed with a calcareous lid, having usually a minute central perforation." † In the "Crag Polyzoa" Mesenteripora was placed in the family Tubuliporidæ, whereas in the Cyclostomata of the same author it was placed as the second genus of the family Diastoporidæ. Mr. Hincks in his Brit. Marine Polyzoa disallows either the family Diastoporidæ, or the separation as a genus the Mesenteripora; he places in one family—the Tubuliporidæ—as Diastopora whether they be discoidal expansive, or foliaceous, and all that he troubles himself with is the character of the cell. In his justification of this judicious course, speaking of the genus Porella, Gray, Mr. Hincks says,‡ "Unless we are content with the old and (certainly very simple) method of lumping all erect forms together, without any reference whatever to the cell, we have only a choice between these two courses, to found genera for the variations of growth as well as for the more important modifications of cell in each family, or to make the zoœcium (cell) the basis of the genus and treat the ordinary variations of habit subsectionally." In deference to an opinion like this, it will be necessary to spend some little thought upon Polyzoa cells in general, but on the cells of the Diastoporidæ in particular.

A cell is one of the most typical elements in the zoarium of a Polyzoon; so much so, that it has been accepted as a base on which the classification of a very large group of Polyzoa may safely rest. There is constancy in the character of the orifice, and according to their arrangement—the endosarcal passages in their sides and ends, and also according to the shape—incurvation or expansion of the lips of the orifice, so the greater may be broken up into smaller groups or genera. This is one of the chief charms of the Rev. Thomas Hincks's classification in his work on British Marine Polyzoa. Whenever we are dealing with a group like the Cheilostomata, the importance of an arrangement like this cannot be over-estimated. But even here there is one small cluster—small comparatively—that will not yield to this mode of dealing with them. This cluster is the Cellepora, and whether we are dealing with British, Foreign, or Fossil species, the difficulties are much increased whenever we recede backwards in time. While we are dealing with recent species there are elements of structure in the cell that we may rely upon for a classificatory purpose. These are the Chitinous organs or the opercula which serve the purpose of lids, or, in other words, of oral valves of the cells. In the Cyclostomata there is very little that may be relied upon as a valid test in the cells, especially in the early stages of a colony. We must therefore base our observations on the early, as well as on later stages, before we can pronounce positively that a primary cell disassociated would have developed into a Stomatopora or into a Diastopora. Yet there are elements even here, which, if closely followed, will betray the character of the future colony, proximately, if not positively. In Diastopora, the primary cell very early takes up a proper position in the zoarium. It is not always central, but it soon adapts itself to the exigencies of its position so as to compel (I do not mean intellectually compel) all the other cells to assume first a flabellate and ultimately a circular arrangement around it. I have before me an Oolitic Terebratula, and one of its valves is partially covered with numerous colonies of a proliferous Diastopora. Many of the circular patches send out a strong primary cell, and very soon a development takes place by gemmation which assumes the forms already indicated. On the Terebratula there are no fewer than fifty colonies which can be conveniently studied for habit alone. As in the fossil, so in recent types of Diastopora, with a somewhat constant and peculiar habit—not essentially so—there is found a pretty constant type of cell. It is similarly so in the Foliaceous Diastopora, or the Mesenteripora of Blainville and Busk. It is very true that this last genus often appears in its earlier stages sometimes as a circular, sometimes as a branching, and sometimes as a bilamellate form. Yet those who have closely studied the Oolitic types—the crag types I have not been able to study except from the figures in Professor Busk's "Polyzoa"—will soon see that the type of cell in the early, or encrusting stages of Mesenteripora, are very different from the more rounded and less connate types of the Diastopora cell.* Take the three types of the one species, *Mesenteripora meandrina*,† given by Busk, and we see at a glance that the cells of this type differ from the cells of ordinary Diastopora. Here the cells are contiguous, sometimes rounded or flattened, and sometimes connected, only apparently so by the cell walls. The distal part of the cells is rarely produced as in Diastopora; but we must not push this character too far, for I have met with examples of specimens that may be placed with Mesenteripora or Diastopora indifferently, some of whose cells are produced. It will be well, therefore, in consideration of the difficulties surrounding these types, to keep them divided, but

* P. 109. † *Ibid.*, p. 110.
‡ "Ann. Mag. Nat. Hist.," Feb. 1879, p. 160.

* I am not in the position, from the want of proper material, to revise the Oolitic Mesenteripora, but I very strongly suspect that some of these will have to be passed over to the Cheilostomata. The types of the cells in some species are unlike ordinary Diastopora cells.

† Plates xvii., xviii., and xx. of "Crag Polyzoa."

not widely so ; and if we merely recognise the characteristic features of the two groups we shall find that if, as Haime has done, we divide the genus into single and double, we shall overcome many of the difficulties which beset us in these intricate studies.

The character upon which Blainville relied in his division of the simple and double types of Diastopora was the lamella which separated the leaf-like growths. In all the Mesenteripora figured by Busk this character is shown. It is not however a unique character for this group alone. The Ptilodictyæ of the older rocks have a similar character, and after very closely investigating this feature in the Ptilodictyæ and in the Oolitic Mesenteripora, I cannot attach much importance to it in a classificatory point of view. It is well to note the peculiarity, as some systematists may attach importance to a feature like this. In the case of Blainville the foliaceous species occupied a medium position between the Escharoid Adeone and Retepora. The assumption was a false one both in a structural and in a classificatory sense, and for this, if not for anything else, the name ought to be abandoned. D'Orbigny, however, preserved the two divisions, but re-christened one, and to some extent Bi-Diastopora, D'Orb., and Mesenteripora, Blain., are synonymous terms. The foliaceous types were made to do service under other names, such as Elea, and Multelea and Lateromultelea—divisions by no means essential or valuable when endeavouring to establish, in a popular treatise like the present, the probable relationship of the Diastoporidæ.

The name of one division of this family may well be glanced at here, because it still keeps a place in some of our Natural History literature, the genus *Berenicea*, Lamx. The type of the genus is a Diastopora, the *D. diluviana* of the environs of Caen. It comprehended also two living species which cannot be determined by a reference to the illustrations of the author. Jules Haime maintains the genus in his work on Jurassic Bryozoa. If we accept the type of Lamouroux we are not bound to accept the genus, for the very simple reason that many diverse forms have been grouped together in accordance with the original blunder of the founder. It is the same with Ceroipora, Gold. It may, however, be essential to retain the name for species of the Diastoporidæ in the Palæozoic Rocks, but that will be considered further on.

I am not able to speak very critically of the Diastopora of the Cretaceous Rocks. I have, it is true, a few specimens that have been identified with described types, but I have not been able to verify identifications that have been made for me out of kindness. If there be friends living in Cretaceous districts, either foreign or British, who will allow their collections of Diastopora to be examined, I shall be glad to undertake the labour of description, otherwise I shall pass on to the Oolitic types, which are numerous and well preserved ; and here I find much to compel a student to pause if only to admire the beauty of the types, or the means by which things so small have been preserved.

Attercliffe, Sheffield.

(*To be continued.*)

NOTES FOR SCIENCE CLASSES.

[*Continued from page* 53.]

Part III.

In our last notes we traced the various layers in roots, now let us again briefly refer to the stems in section. Take a branch of the pine, if possible the second year's growth ; our illustrations are from the *Pinus excelsa*, a specimen from which may be secured through any gardener or public park. First observe the parts, as already worked out in the lime, and compare with the transverse section of pine stem (fig. 169).

When cutting any section containing resinous secretions, a little methylated spirit should be used on the blade of the razor : this will counteract any unpleasantness from its sticky nature. Notice No. 1, the bark, a thick layer of cortical ground tissue, containing chlorophyll, with a prominent epidermis on the outside ; 2, cambium ; 3, second year's concentric layer of woody bundles, or xylem ; 4, first year's xylem, in which are seen resin passages ; 5 is the medullary sheath ; 6, medulla or pith ; 7, one of the medullary rays ; and 8, resin passages in the bark.

Then, having cut several longitudinal sections, select one as perfect as possible (see fig. 170, longitudinal section of pine stem) ; No. 1 is the cambium ; 2, second year's xylem ; 3, first year's xylem ; 4, medullary sheath ; 5, medulla ; 6, medullary rays ; 7, note the starch cells in this portion of the section ; and 8, epidermis. In observing this specimen, care should be taken to understand the resin passages, seen abundantly in the older wood ; it should be examined beneath a high power, when it will be seen to be a large intercellular space or passage, in this case known as a resin passage. (See Sachs' "Text Book," and Thome's "Structural Botany," for explanation, &c.) Also, the xylem in longitudinal section should be submitted to a higher power, to detect the beautiful and characteristic markings, or pitted tissue.

Whilst the pine is being studied, and during the same lesson, a transverse section of one of the leaves should be made (see fig. 171). Mark carefully the position of the phleum and xylem, respectively ; the numbers refer to : 1, epidermis ; 2, ground or fundamental tissue, or parenchyma, containing chlorophyll ; 3, bundle sheath ; 4, xylem—this is readily detected, being darker in colour than No. 5, or phleum.

There are other portions, which play an important part in vegetable physiology, in connection with the bast-cells: these may be found in the phleum of the lime, but it is more easily traced in the stem of the vegetable-marrow or cucumber; either of which may be procured at almost any season of the year. We and 4 the epidermis. Now examine 2 with a higher power (see fig. 173: sieve-plate), the sieve-plate will be found in the transverse section; then notice the same in a longitudinal section—it is seen to be composed of spiral vessels, surrounded with a thickened wall. Our

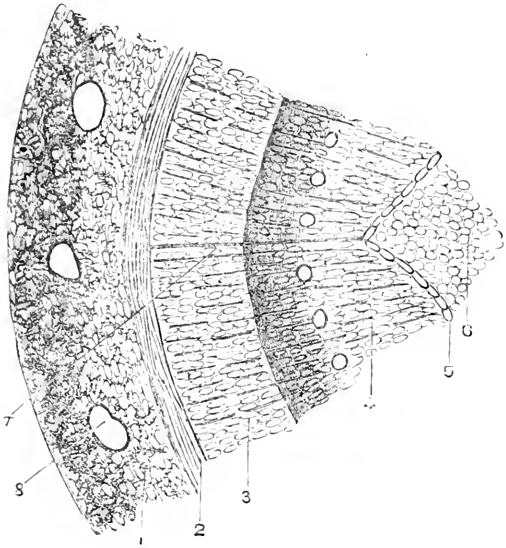


Fig. 169.—Transverse section of Pine-stem.

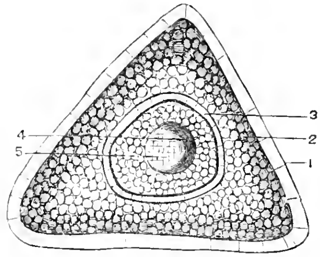


Fig. 171.—Transverse section of leaf of Pine.

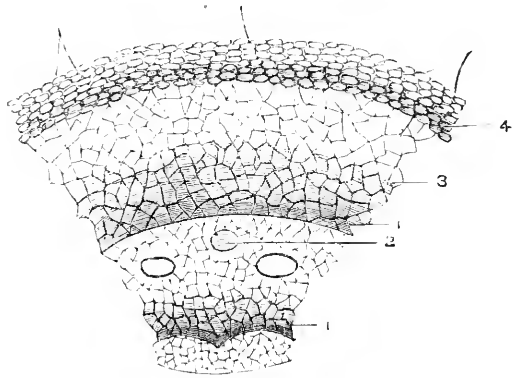


Fig. 172.—Transverse section of stem of Cucumber.

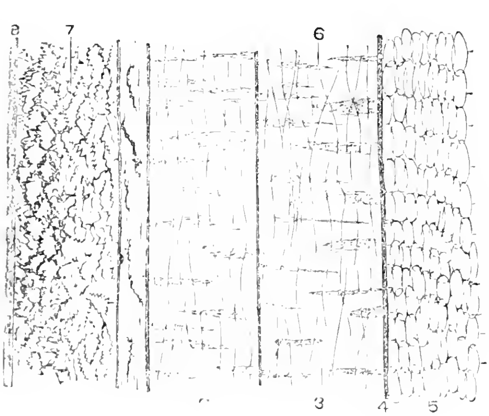


Fig. 170.—Longitudinal section of Pine-stem.

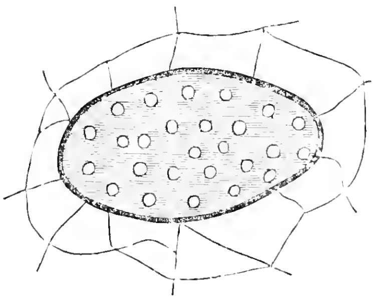


Fig. 173.—Sieve-plate from Transverse section of stem of Cucumber.

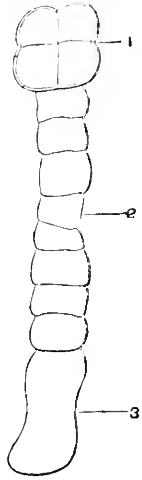


Fig. 174.—Suspensor of the Shepherd's-purse.

now refer especially to the *sieve-tubes* and *sieve-plates*. (See fig. 172: transverse section of part of the stem of cucumber.) No. 1, 1 is hard-bast or bast fibres—this is darker in appearance than the cells adjoining No. 2, or sieve-tube; 3 is succulent ground tissue; object is to simplify the lessons, hence we do not give a detailed description of the form and economy of the sieve-tubes—it would occupy too much space; besides, it is entered into fully in the volumes previously recommemded.

Our next (fig. 174) is the suspensor from the ovary of the Shepherd's-purse (Capsella). We ought at the outset to explain that this requires a little patience in working out, though the difficulty in finding it is really very trifling if care be exercised. Pluck several plants for examination, taking only the *pods* just fertilised, or where the petals appear to have just fallen, at the summit of the flower-stalk, and placing the entire pod on the glass slide with a drop of water, over which put the thin cover-slip. Now rub gently on the cover-slip with the tip of the finger by a circular motion; this will liberate the ovules as well as burst the testa. Thus set free in the water, examine carefully for the *suspensor* (fig. 174). If you are not successful on the first occasion, try again, it will repay your troubles in the end. After fertilisation the germinal vesicle develops into the suspensor. No. 1 is the embryo (this splits up into cells, &c.); 2, cells of the suspensor; and 3 is the large lower cell of the suspensor.

J. F. R.

ON BRITISH FRESHWATER MITES.

By C. F. George.

[*Continued from page* 194.]

No. II.—"Hygrobatides."

First Family.—Arrenurus (*Dugès*).

THE mites of this family are readily distinguished from all other water mites by their peculiar palpi; these organs have the individual joints rather short and wide, compared with those of other Hydrachnæ, and consequently the palpi are themselves comparatively short. Fig. 175 represents the mandible of a male *Arrenurus viridis*, and fig. 176 that of another Arrenurus, the name of which I do not know. It will be seen that the first joint is very small; the second much larger than the first, and rather wider than long; the third rather smaller than the first, but less than the second, and rather broader than long; the fourth much the largest of all the

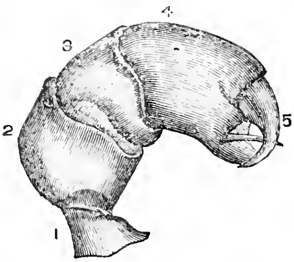


Fig. 175.—Mandible of *Arrenurus viridis.*

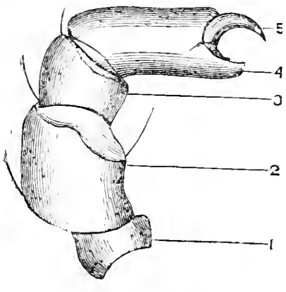


Fig. 176.—Mandible of *Arrenurus, sp.?*

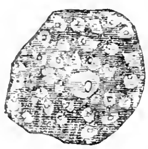


Fig. 177.—Portion of skin of *Arrenurus buccinator.*

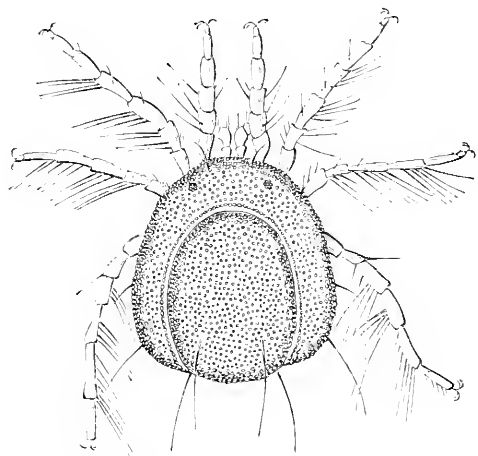


Fig. 178.—Female of *Arrenurus* (⅝ objective and A eye-piece).

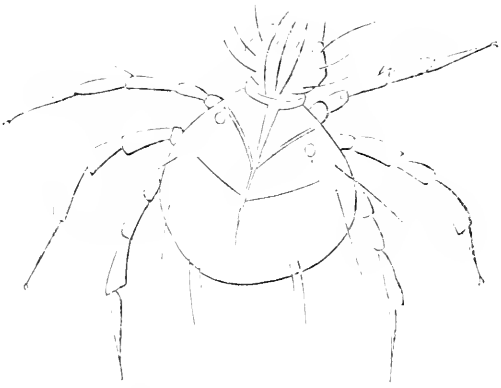


Fig. 179.—Larva of *Arrenurus* (from a rough mounted specimen).

joints, having the anterior inferior corner projecting somewhat like a claw; whilst to the anterior superior angle is articulated the fifth joint—this latter, claw-shaped and very movable—forming with the anterior inferior angle of the fourth joint a very powerful pair of pincers, reminding one of the large claw of a crab, or perhaps rather more like the beak of a parrot; and this resemblance is very striking when one of the creatures is confined alone, with a little water, under a piece of thin glass, for it then continually moves the palpi, and at the same time snaps the pincers, as if angry. This family is a very numerous one: Koch describes and figures forty species, some of which however have palpi distinctly different from those I have figured and described (they ought therefore to be removed, and will not be considered by me as Arrenuri). They vary extremely in their general appearance, some of them being grotesque in shape, and most of them very beautiful in colour, not only when alive, but also when mounted. They are sometimes called hump-backed mites, and the males of many of them have received the name of tailed mites—a very appropriate title, as will be presently seen. I shall divide them into two sections, from the nature of their skin:—

1. The Chitinous, or hard-skinned.
2. The Membranous, or soft-skinned.

The first division is the more numerous, and contains the tailed mites; from the hardness of their integument they can be mounted in balsam, without losing their shape. This integument looks as if composed of separate perforated plates joined together (fig. 177), reminding one of a coat of mail; it has also on it a most remarkable and deeply impressed more or less oval or circular line, complete in the female, but open behind in the male; the chitinous skin is so much thinner along this impressed line that it is not difficult to detach the central part from the rest of the body of the mite, tearing at the line, just as a piece of paper tears most readily where it has been folded.

Fig. 178 shows well the granular and perforated chitin skin, and also the impressed line: there are a few long bristles, more conspicuous at the hinder part. Koch lays great stress on these bristles, saying there are four or six of them, and he uses their presence or absence as a character to distinguish one family from another. With regard to the colour of these mites, it is somewhat variable, and much depends upon the contents of the bodies, but some is inherent in the chitin skin, and is usually blue, green, or yellow: the blue becomes a very beautiful one when the mite is mounted in balsam. With regard to shape, the males differ so greatly that each one needs a figure; also there are several types of form in the females, but I have not found it easy to pair the males and females, only in the case of *Arrenurus globator*, am I satisfied on this point. The legs are rather short, the front legs being the shortest, and the hind ones the longest; the swimming bristles, attached to the three last joints but one, are few on the first pair, and most abundant on the last. The thigh plates are minutely granular. The eyes are large, far apart, and with some lights appear to be of a very beautiful carmine colour in most species. When confined in a glass vessel of water, the females will lay their eggs on the glass: they are generally of a pinkish colour, and surrounded with a whitish opaque substance, which seems to be the material used to fasten them to the glass. When the eggs hatch, a minute larva is produced, which has but six legs; from their appearance I have no doubt that they then become parasitic, but I have not yet discovered what creature becomes their host—this, indeed, on account of their minute size, will be somewhat difficult to make out. Here then is a problem for observers, which must be solved before the complete life circle of the Arrenuri can be said to be thoroughly known.

NOTES ON THE NATURAL HISTORY OF SPAIN.

SPAIN is a country which has not yet become very familiar to English tourists. Moreover those of our countrymen who do visit it, are oftener students of art than of nature. Hence a few observations made during a month's stay in the peninsula, chiefly in Andalusia, may be worth recording. The traveller who has left Madrid by the evening express awakes to a new world when the breaking dawn reveals to his sight the picturesque neighbourhood of Cordova. Long lines of glaucous aloes form the hedges, with their graceful leaves and gigantic flower-stalks. Another favourite hedge-plant is the prickly pear (*Cactus opuntia*). Its outline appears very novel and grotesque to an Englishman, but its bright yellow flowers, which were just expanding at the beginning of May, are very attractive. It certainly forms a most effective fence, for the wounds inflicted by its spines are extremely painful, as I can testify from experience. Some fine specimens of the date palm exist both at Seville and Cordova. Those planted in the court of oranges at the latter place are of great age and very beautiful.

Of wayside flowers, a large pink convolvulus is abundant throughout Andalusia, flourishing in the driest situations. A tall Echium was also very conspicuous. On the spurs of the Sierra Morena, a charming dwarf Iris, not more than four inches high, made gay mauve patches, and in waste places there was a fine display of crimson Gladiolus. Upon the trees there climbed a graceful creeper with deep purple tube-like flowers. The natives called it the candle plant.

In the neighbourhood of Granada the damp woods were profusely decorated with the mauve stars of

Vinca major. A bright pink cistus adorned the hillsides, and an elegant orchis with blue and yellow flowers (allied to *apifera*) flourished in the most arid situations. Down in the deep channel of the Darro, *Adiantum capillus-Veneris* fringed the damp rocks with its delicate fronds. The only other fern I noticed in Andalusia was *Ceterach officinarum*, and it was much less luxuriant than we find it in Somersetshire.

At San Fernando, on the sandy common, there was abundance of a beautiful pale mauve flower, allied to *Statice limonium*, but larger and finer. Everywhere the scarcity of Umbelliferæ was marked, but the Compositæ were numerous. Our chrysanthemums (or close allies of them) were abundant. The scarlet pimpernel was common by the banks of the Guadalquivir, and also a bright blue species.

Large pale Antirrhinums flourished on old walls, as on the ramparts of the Alhambra and the old bridge at Toledo.

An Englishman sighs for large forest-trees. Interminable olive groves cover the hillsides. The Ilex is equally abundant, and more handsome, but of the same tint, a glaucous hue, the prevailing colour of vegetation in Spain. A peculiar grace is often imparted to vegetation by the elegant waving stems of the sugar-cane. But though the English botanist in Spain is charmed with the variety of novel plants, with the gaiety of the wayside flowers, and the striking outlines of cacti, palms, and aloes, he meets with such vast tracks, bare of a single blade of grass, that he cannot fail to return with immense satisfaction to the green lawns and rich meadows of his native country.

Wm. C. Hey.

A CHAPTER ON FOSSIL WORMS.

DARWIN has recently shown how geologically important is the common earth-worm. Doubtless a biologist as intimately acquainted with the life-histories of other insignificant creatures would be able to prove that the most insignificant of them plays some part or other in geological operations. They may not be founders of continents, like the Foraminifera; but the world, as we find it, would have been different in some way or another if they had not existed.

A worm is the lowest member of a sub-kingdom of animals on which perhaps more changes have been rung than on any other. It is an annulose, or ringed animal. It forms the foundational structure which may be modified according to circumstances, into a lobster, crab, scorpion, spider, butterfly, beetle, bee, dragon-fly, cockroach, or house-fly; besides other creatures which crawl, fly, or swim. It may throughout life retain the primitive structure which we are acquainted with in the common earth-worm or lobworm; or this may be but the first stage in a series of subsequent improvements and modifications, as in the grub-like larvæ of the bee and beetle, or the caterpillars of the moth and butterfly.

Just as the worm or annelid type is largely a fundamental one, so is it one of the most ancient, geologically speaking. In rocks, where traces of neither mollusc nor zoophyte are visible, tracks of ancient sea-worms have long been known. No other creature can claim such a geological immortality. Not even foraminifera are more eloquent or trustworthy witnesses of the slowness with which certain deposits were laid down than they are. In all marine formations, from the Cambrian to the latest Tertiary, sea-worms have left abundant proofs of their existence.

We are aware that many of the so-called "worm or annelide tracks," in Silurian rocks, such as those denominated *Chondrites* or *Cruziana*, may have been left by creeping mollusca or crawling crustacea. But in the absence of the solid parts of these creatures in the fossil state, it is safer to assign such tracks to worms. In deposits where fossil univalves and crustaceans are actually met with, such tracks may have been left by them. Still, the careful student cannot but be aware, from his quiet study of any low-water mud or sand-flat at the present day, that for one track left of crustacean or mollusca, ten are left by sea-worms. In short, they are the great track makers, as well as sand-diggers, and we may safely give them this position without minimising the importance of the markings left by other animals.

If *subsidence* of certain parts of the sea-floor were not accepted as a geological and geographical fact, sea-worms would prove it more than any other animals. For when we find such rocks as the Longmynds composed of strata, all more or less of a similar physical character and composition, on whose upper surfaces are innumerable tracks of sea-worms for at least one mile in vertical thickness, no other theory could account for the conditions under which they had been formed than that which declares the sea bed was slowly subsiding at about the same rate that the sediments were accumulating. Moreover, the same worm-tracks more or less indicate the depth at which such deposits were formed, for we never find these markings in strata of deep-sea origin, and the supplementary evidence of the ripple-marks so frequently occurring in worm-tracked strata, is confirmatory on this point.

Geology has little or nothing to say concerning terrestrial worms, unless it refers to their physical action in modern times. We are not aware of a single species which can be safely referred to the same habitats as our common earth-worms, although we have little doubt this class has been in existence perhaps during the entire Tertiary period, if not longer. We have therefore only to do with sea-worms. These, as we now know them, may be divided into two groups, those which crawl or swim about (as the lobworms and the *Errantia* generally), and those which adopt a fixed existence. The latter have no hard parts to leave behind them when they die, except their horny jaws, and these (as will be seen shortly) have been found by Dr. Hind in considerable quantities in the favour of those tracks being of annelid origin. The other class of sea-worms adopting a settled marine life, live in tubes, which are formed of grains of sand, etc., cemented together, as in the instance of our modern *Terebella*, or they may be leathery, as in the

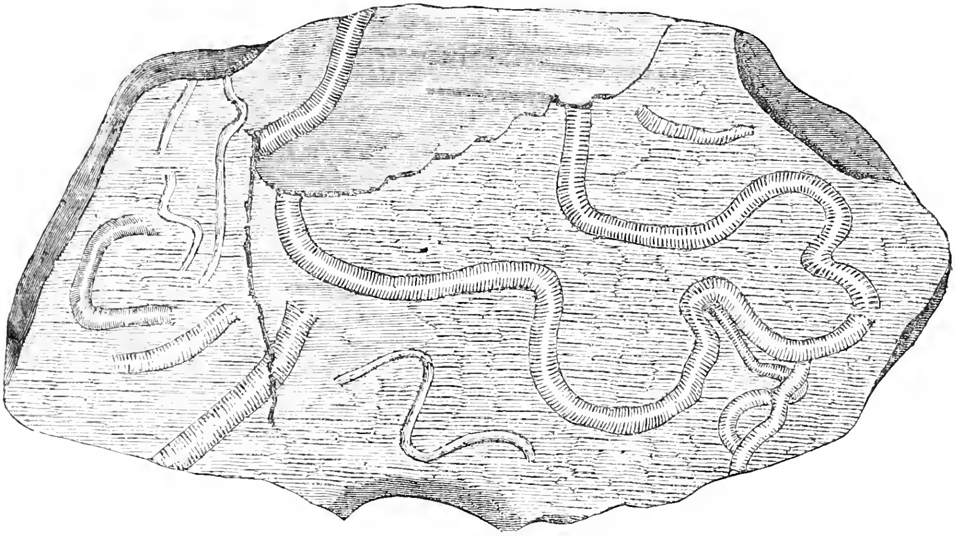


Fig. 180.—Worm-tracks on Flags in Quarries near Kirby-Lonsdale, Yorkshire. Lower Carboniferous formation. ¼ natural size.

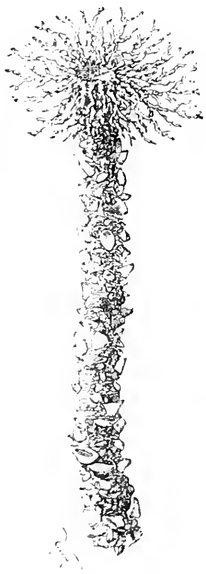


Fig. 181.—Tube of *Terebella*, formed of cemented sand-grains.

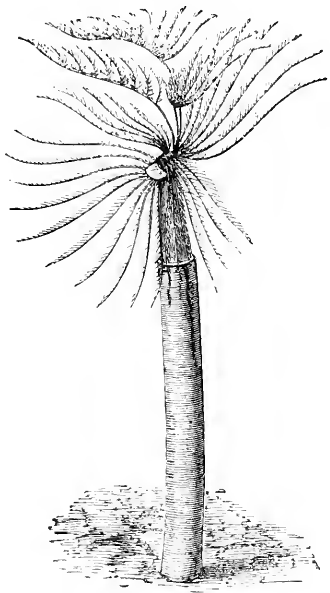


Fig. 182.—Coriaceous tube of *Sabella unispira* (recent).

Silurian and other rocks. Until a few years ago we were entirely indebted for proofs of the former existence of this class of sea-worms for the tracks they had left behind them on the primeval mud flats, and the discovery of their jaws is additional evidence in recent *Sabella;* or their outer skin may secrete lime, and thus form a solid tube, as illustrated by the empty tubes we see attached to old oyster shells, stones, and rocks. In both the latter cases the breathing organs are gathered into one place, and form a beautiful feathery tuft, sometimes brightly coloured, as in those of that little coiled worm which rejoices in such a high antiquity, the *Spirorbis*.

Let us take the wandering worms (*Errantia*) first in order, as they undoubtedly were first in point of appearance in the earlier seas of our globe. The names assigned to the commonest of the tracks and trails believed to have been left by them are borrowed in most instances from modern genera; thus we have *Phyllodocites*, *Myrianites*, *Crossopodia*, *Arenicolites*, &c. The markings we have to explain are of two kinds, burrows and trails. The sea-worms making the former were doubtless of similar habits to our common lob-worm (*Arenicola piscatorum*) and the generic name of *Arenicolites* at once indicates this.

their eyes open to the periodical mending of the roads and causeways of the towns in which they live. In the neighbourhood of Manchester and Sheffield the newly-laid flags are often seen ripple-marked and worm-tracked or worm-burrowed. The Cambrian and Silurian sandstones afford similar evidence of shallow water deposition. In the Stiper Stones (Upper Cambrian) both casts and burrows are abundant. In the Bangor slate quarries the markings are called *Chondrites*, from the original belief that they were impressions left by sea-weeds, but we favour the theory of their annelid origin. In the slate quarries near Douglas, in the Isle of Man, there may be frequently found the tracks of two kinds of sea-worms, *Nereis* and *Nemertites*. As before remarked,

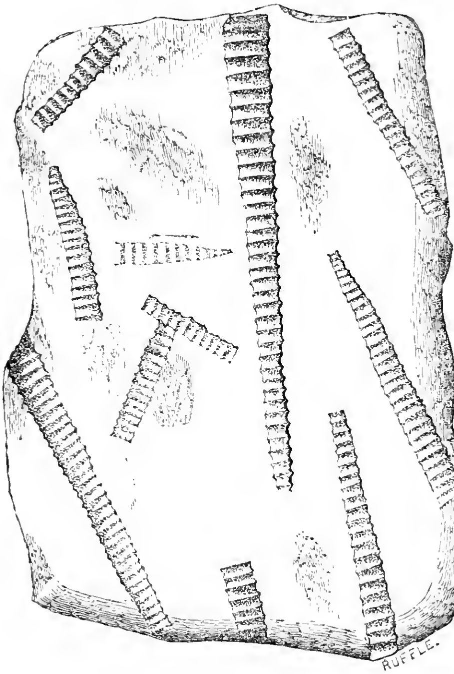


Fig. 183.—*Tentaculites annulatus*.

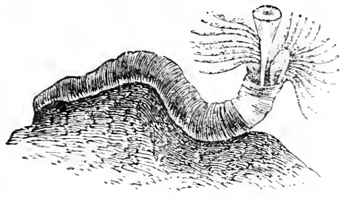


Fig. 184.—*Serpula* with tentacles expanded (recent).

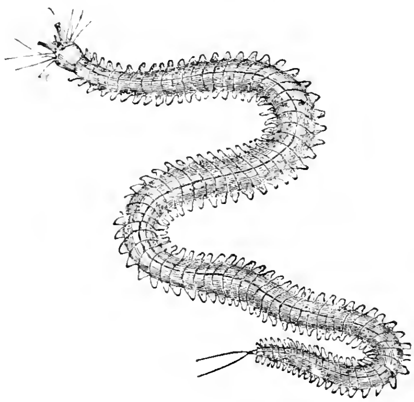


Fig. 185.—*Nereis* (recent).

The Cambrian rocks of Bray Head, near Dublin, have long been famous for the occurrence of markings left by an ancient burrowing worm, named by Dr. Kinahan *Histioderma Hibernicum*, associated with the zoophyte *Oldhamia*. The tubular casts of these worm-holes may be obtained. The upper part swells out into a trumpet-shaped mouth, frequently very prettily marked. The holes of *Arenicolites sparsus* and *Arenicolites didymus* are in pairs, and are found in the same beds as *Histioderma*.

The flag-stones obtained from the millstone grit formation in Lancashire and Yorkshire have their surfaces frequently knobbed irregularly with the casts of worm-furrows. Young geologists who often sigh for opportunities to geologise abroad should keep

however, the Longmynd rocks afford by far the largest number of evidences of ancient sea-worms. In the Wrekin the quartzite beds yield *Arenicolites Uriconiensis*, which may be considered the oldest known British fossil. The rocks of St. David's contain both *Arenicolites* and *Serpulites*. In the Skiddaw slates, near Keswick, Cumberland, ten species of the remains of fossil-worms have been catalogued, among which *Scolithus* and *Helminthollithus* are the most abundant. One remarkable species has been named *Stellascolites*.

In many parts of Great Britain the lower Carboniferous rocks possess most abundant traces of worm-tracts. Any tourist who has visited the magnificent Cliffs of Mohr, in county Clare, Ireland, cannot fail to have noticed the dark slaty flags of the district, marked all over, below and above, with sinuous worm-tracks. These cliffs rise sheer out of the green Atlantic to a height of three hundred feet, and appear to be of the same character throughout. Everywhere, where it is possible to examine them, the thin flags are crowded with these peculiar markings. People who have been to the celebrated quarries in the same geological formation near Kirby-Lonsdale, will have observed the flags impressed in a similar way. We give a sketch of them as they appear in a hand specimen. As these Kirby-Lonsdale flags are much in demand by house builders in the north, and therefore get widely distributed, some of our readers may have seen them a long way from their parent quarry. The commonest of these worm-markings is *Crossopodia.* In Penwhapple Glen, Girvan, Ayrshire, many species of worm-tracks have been recognised, belonging to *Nereites*, *Myrianites*, *Crossopodia*, *Nemertites*, etc.; annelid markings are also found in the shales at Moffat. A peculiar kind of worm-track, called *Cymaderma*, is left on the surfaces of the Lower Carboniferous rocks near Settle, in the Valley of the Ribble.

No doubt most, if not all, of these tracks were made by worms like our common *Nereis.* This had long been suspected before Dr. Hind, by dint of great patience, discovered annelid jaws in the Silurian shales at Ludlow, Much Wenlock, Iron Bridge, Stoke Edith, and elsewhere. These are figured in his paper on the subject read before the Geological Society. The largest of the annelid jaws he found so plentifully did not exceed one-fifth of an inch. Dr. Hind has proved that these jaws differed as much among themselves so far back as the Silurian period as they do now—a plain indication of the antiquity of the tribe.

Worms which form tubes cannot of course make tracks, but they leave evidences of their existence behind them in the fossil tubes they once inhabited. These sometimes form strata of no inconsiderable thickness. Indeed, any geological student who has visited the seashore of St. Bee's, Cumberland, at low water, will have noticed extensive beds formed solely of the cemented sand-tubes of modern species of *Sabellaria.* *Sabellaria* and *Terebella* are very common tubed worms in British seas, both of them constructing sand-cemented tubes. The latter is always abundant where there is a hard, clayey sea-bottom. It is rarely that we get these worm tubes fossilised, as they tend to fall into their component grains of sand when the worms die.

With the hard, calcareous tubes of such species of sea-worms as *Serpula* and its kind, we have no difficulty. This form of annelid has had perhaps a more stereotyped or stable form of existence than any other creature in the world. There is no ostensible difference between many Silurian tubed worms and those now in existence. The pretty little *Spirorbis* found in the Upper Silurian rocks has had a continuous and unchanged existence through every geological period until now. We find it attached to fossil shells and coral beds in the Silurian and Devonian limestones. Fourteen species occur in the Carboniferous rocks, some of them found adhering to the trunks of *Sigillaria* and almost encrusting them, just as we find them adhering to the larger sea-weeds along our shores. Under the names of *Serpulites*, *Cornulites*, *Tentaculites*, *Conchiolites*, etc., the sea of every geological period has abounded in tubed worms. The Wenlock limestone literally swarms with these tapering elegant tubes, ringed like the tentacles of insects, and hence called *Tentaculites.* This is a type of what is called a *free* worm-tube, i.e., one that is not attached to shells or rocks, like the modern *Serpula.* Formerly it was regarded as a pteropod mollusc allied to *Hyale.* *Cornulites* is another genus nearly related to it, and both are characteristic of the Silurian formation. The chief species in the latter rocks is *Cornulites serpularius.* It is frequently found as much as three or four inches in length, ringed, and gradually tapering to a point. Casts of this species of worm tube frequently occur, and the young student might be easily misled by them into thinking it was a different fossil to the *Cornulites* found with its external shape; for this internal cast is in a series of sharply marked off segments, one within but less than another, like the fully drawn-out parts of an old-fashioned telescope. This species is very abundant in the Woolhope beds. *Ortonia* (named after Professor Orton) is a genus of abundant annelid tubes, also free, which is peculiar to the Upper Silurian rocks of North America. *Tentaculites annulatus* is the commonest of our British species; *T. ornatus* being perhaps the prettiest. The former is more abundant in the Lower Silurian rocks at May Hill, and elsewhere, and the latter in the Upper. The Wenlock shales are very rich in fossil-worms, Mr. Etheridge recording no fewer than thirty-five species of all kinds, Dr. Hind having added twenty-four. Among the characteristic forms of these beds are *Trachyderma* and *Aranellites.*

No doubt there were ancient sea-worms resembling *Serpula*, and it is possible some may have been intermediate between it and the modern *Sabella*, which latter is possessed of a leathery tube, often strengthened by adhering sand-grains. Thus, in the Upper Silurian rocks about Ludlow we meet with numerous traces of a thin calcareous worm-tube, transversely striated, and very ribbon-like, called *Serpulites longissimus.* *Trachyderma coriacea* is still more like a Sabella tube stiffened by a deposit of lime. *Scolioderma serpulites* is found in the rocks of the Wrekin and in the holly bush sandstones near Malvern. *Serpulites dispar* is abundant about Ludlow, and also in the Upper Silurian rocks near Kendal; and the student will find a capital collection of them in the museum of that town. A more delightful neighbourhood for fossilising than Kendal can hardly be found in England, or a more varied one. We have seen *Serpulites* more than a foot long in the deserted Silurian quarries near Ledbury.

The secondary rocks contain true *Serpula*, and these fossils are not without a special value to the physical geologist. Some of them may be found sprawling over the interiors of bivalve shells, or covering the naked tests of sea urchins—in both instances plainly informing us that the life and death conditions of the ancient sea-floors were very like those of our day. Moreover, the occurrence of these creeping worm-tubes over the dead tests of such sea-urchins as the *Ananchytes*—one of the commonest in the chalk—shows us that the chalky ooze must have been forming very slowly, or it would have buried up the dead animals before the sea-worms had managed to spread their tubes over and about them!

We frequently get the tubes of *Serpula* attached to fossil bivalves in the Lias and Oolitic rocks: sometimes they form dense and tortuous masses, as in the Oolitic marlstone near Banbury, and in the well-known "Serpula-bed" at Blue Wyke Scar, near Scarborough—where the geologist may obtain abundant fossils and enjoy some of the finest coast scenery in England at the same time. The Tabular Ironstone of the Gault of Kent is frequently full of annelid borings. A hard band of clay in the Gault near Charing, in the same county, is occupied with serpula tubes, which form a thin stratum two inches thick. *Serpula plexus* is always common in the chalk, and near Norwich and Margate it frequently occurs in masses, or completely investing the larger fossil shells, such as *Inoceramus*.

In the Eocene beds the commonest fossil worm-tubes are those of *Ditrupa*, which was evidently free or unattached to objects, after the manner of the *Tentaculites*, &c., already described. It is usually found in large numbers, and appears to have been gregarious in its habits. We may get large numbers of this fossil worm in the London clay beds of Bognor, Hampshire. *Ditrupa plana* is the name of the common species. Ditrupa is also found in the Crag beds of Suffolk, but it may have been redeposited there from denuded Eocene strata.

J. E. TAYLOR.

HOW THE FUCHSIA IS FERTILISED.—In your August number, Mr. E. Step states that the good offices of bees are necessary for the fertilisation of fuchsias, as the stigma is so situate that the pollen cannot fall upon it. He is however mistaken on this point. I have known for some years that fuchsias grown in windows produce ripe fruit, and since reading his statement I have noticed that fertilisation is brought about by pollen which falls upon the viscid edges of the stigma; this being so indoors without motion, insects cannot be necessary for fertilisation in the open air, where the wind keeps the flowers moving.—*William Bradley*.

THE FLORA OF WHITBY.

BEAUTIFUL for situation is Whitby, and deeply interesting alike to the archæologist for its ancient abbey (the home of the first Saxon poet, Cædmon), to the artist for the charming views to be met with almost everywhere in its neighbourhood, and to the botanist for its flora. Thinking that, of the thousands who yearly visit this health-giving resort, there may be some to whom some information as to the wild plants of the district will be acceptable, I will briefly jot down a few notes likely to be of interest to such. First, let me state, that the physical contour of the district, with its steep hills and rapid streams, causes an entire absence of all those freshwater plants, so common in many parts of England in stagnant ponds, and sluggish drains. The searcher for salt-water plants will, however, find ample scope for work in Saltwick Bay; and along the sloping sides of the cliffs which surround it may be found during different periods of the year, *Arenaria peploides*, *Triglochin palustre*, *Galium palustre*, *Plantago maritima*, *Parnassia palustris*, *Epilobium hirsutum*, and *Cochlearia officinalis;* while on the top of the cliffs are *Poterium sanguisorba*, *Erythræa centaurium*, with many others. On the slopes of the West Cliff, will also be found abundantly *Pinguicula vulgaris*, *Parnassia palustris*, *Listera ovata*, *Gymnadenia conopsea* (the fragrant scented orchis), and close by the Battery, *Genista tinctoria* with its glabrous green leaves and bright yellow flowers. Here, too, but earlier in the season, is *Anthyllis vulneraria*. Leaving the town, the botanist will find excellent ground in the woods surrounding Mulgrave Castle, famous in early spring for *Galanthus nivalis*, and, later, for *Primula vulgaris* in rank profusion. One of the pleasantest walks he can have, is across the fields to the village of Ruswarp. On descending the steps, leading into the natural basin in which this village is situated, believed by geologists to have been the bed of an ancient lake, he may pick up *Ranunculus sceleratus*, *Apium graveolens*, and *Alisma plantago*, and on the low muddy shore of the river close by, where the high tides often flood the flat expanse with sea water, *Glaux maritima* and *Aster tripolium*. Near the Garden House, he will also find *Malva sylvestris* (a plant far from common in this district), *Cochlearia armoracia* and *Chenopodium Bonus-Henricus*. Here, too, the writer has found one solitary specimen of *Borago officinalis*.

Continuing his walk, he will next pass by the long wall of the garden, and on it is *Asplenium ruta-muraria* and *Linaria cymbalaria* in abundance. Along the wall of the old mill at the village, *Cheiranthus cheiri* grows in a perfectly wild condition, as it also does among the ruins of Whitby Abbey *Iberis amara* is very rare, but is occasionally met with. Crossing the bridge, and continuing his walk to the Cock Mill Woods, he will see under a garden wall, *Aconitum napellus*, and in the hedges on either hand, *Lonicera periclymenum*, *Convolvulus sepium* (*C. arvensis* is conspicuous by its absence in this district), and *Tamus communis*. In a wood—a very paradise for botanists—omitting innumerable commoner plants, he will find *Stachys Betonica*, *S. sylvatica*, *Melampyrum sylvaticum*, *Lysimachia nemorum*, and, near the old water-mill, *Myrrhis odorata*, where, earlier in the year, *Alliaria officinalis* and *Allium ursinum* flourished in abundance. Here, too, about the middle of August, are *Vicia sylvatica*, *Lathyrus macrorrhizus*, *Tanacetum vulgare*, *Eupatorium cannabinum*, *Chelidonium majus*, and *Senecio saracenicus*. Another pleasant ramble may be had by first taking the train to Sleights, and then ascending Blue Bank, the hill beyond the village, to the moors above, and oh! what a prospect! Descending thence, into Iburndale, by way of Throstle's Nest, we find *Lactuca muralis*, and in, or near, the cornfields, *Githago segetum*, *Mentha arvensis*, and *Galeopsis Tetrahit*. Clustering under the hedge-rows is the pale green and slender *Corydalis claviculata*, and, in the valley below, *Hieracium boreale*, *Senecio aquaticus*, and *Ægopodium podagraria*, with several vetches—*Vicia tetrasperma*, *V. sepium* and *V. sativa*. Or a day may be agreeably spent in a walk from Grosmont, *viâ* Egton Bridge, through Arncliffe Woods to Glaisdale. On the banks of the Esk, shortly after leaving Grosmont, we meet with *Geranium sylvaticum*, and, in the woods, abundant store of ferns and fungi, as well as many of the plants already mentioned. Goathland, too, is well worthy of a visit. The moors here are covered everywhere with *Erica tetralix*, *E. vulgaris*, and *E. cinerea* with *Vaccinium myrtillus* in plenty, and in the boggy parts *Drosera rotundifolia*. In the water-courses above Darnholme, *Pinguicula vulgaris* and *Pedicularis sylvatica* abound and near Beckhole *Osmunda regalis* is, or rather was, found, for the tourists with basket and trowel have been here. *Polypodium dryopteris* is also to be met with in this neighbourhood. Near Mallyan's Spout, a much-visited waterfall, we meet with *Gnaphalium dioica*, *Valeriana dioica*, *Euphrasia officinalis*, *Ranunculus aquatica*, *Habenaria bifolia*, *Lychnis Flos-cuculi*, *Scabiosa succisa* (*S. arvensis* is singularly rare) and *Digitalis purpurea* in great plenty. The writer has been told that *Trollius Europæus* grows here, but he has never succeeded in finding a specimen. Visitors to Whitby, desiring further information on the Natural History of this district, may apply to

THOMAS NEWBITT.

QUERY AS TO BEE.—The bee described by E. H. R. on p. 232 is *Andrena fulva*. The word "larger" at the end of the third line, is probably a *lapsus calami*, for this species is certainly smaller than the hive bee. With one exception, the males of all British bees are smaller than the females.—*E. D. M.*

PRACTICAL NOTES ON WEATHER STUDY.

SOME time ago (SCIENCE-GOSSIP, October, 1881) I gave the first of a series of "Hints to Local Meteorological Observers." I have been prevented from continuing the execution of my plan; and on taking the subject up again, I think it will be well to make some changes. I now propose to offer from time to time, in no particular order, remarks upon such lines of investigation as amateur meteorologists may follow with a likelihood of arriving at useful results.

The number of people in the British Isles who keep "weather diaries" is, I believe, enormous. They note the state of the barometer, the temperature, the direction of the wind, and the weather. They often put themselves very much about to preserve the continuity of their records. They accumulate a great pile of manuscript observations before they die. And were they asked to describe the nature of the problem to the solution of which they are devoting so much time and pains, they couldn't. The fact is, they have never thought of a problem. They think that in recording the weather they are contributing to the literature of meteorology. So they are; but, heaven knows, meteorological literature of that kind is voluminous enough already.

It is very doubtful if British science would suffer much were all these gentlemen to put their barometers and thermometers in the fire. It is they, I fancy, who supply the local newspapers with thermometer readings when the heat or cold becomes unusual. During the last few winters these readings have been quite phenomenal; many degrees below zero (F.) the commonest thing in the world. It is quite evident that either the printers, the observers, or the instruments must have got a little deranged somehow—most probably the observers. I think it stands to reason that observations of this kind will be fully better conducted at regular observatories, where the instruments are accurate. Private weather diaries have never yet contributed to the progress of meteorology, and they probably never will, for the temperature readings, barometer registers, and other records, generally show internal evidence of such eccentricity that no person is willing to trust them. Although disapproving of such work, it must not be supposed that I mean that there is no useful work for amateur meteorologists to take up. On the contrary, there is a great deal. Astronomy and the natural history sciences have not benefited more by amateur work than meteorology might do. I believe the only reason why it has not hitherto done so is simply because very few people have known what to observe and how to observe it. If I am able to help in any way to overcome this difficulty, I shall feel that I have done something towards advancing meteorology.

The subject of my next paper shall be "The Rainband."

J. A. WESTWOOD OLIVER.

MICROSCOPY.

The Preparation of Dammar Varnish for Microscopic Purposes.—So far as I know, none of the receipts given in books for the preparation of dammar varnish for microscopical purposes enable the amateur to prepare a satisfactory article. Dammar is not entirely soluble in ether, benzole, or turpentine, at ordinary temperatures. If heat be used, the solution is more complete, but, sooner or later, the product will become milky, and then it will be found impossible to clarify it. To obtain a perfectly limpid solution, permanently remaining so, proceed as follows: to 4 drachms of crushed Indian dammar add 8 liquid drachms of pure benzole, and allow the resin to dissolve at the ordinary temperature. After a day or two, an insoluble residue will be found at the bottom of the vessel. Carefully decant the supernatant clear liquid, and add to it 80 minims ($1\frac{1}{3}$ drachm) of spirits of turpentine. The preparation is then complete. The object of adding turpentine to the solution is to ensure toughness in the dried film. The above proportion is sufficient for the purpose. Without the turpentine the dried film would be brittle. I do not think that any advantage is derived from the addition of mastic to the preparation. A very good article as a substitute for Canada balsam may be made with Reeves's or Winsor and Newton's copal varnish, by evaporating it gently over a spirit-lamp in a suitable vessel until nearly all the solvent (turpentine) is driven off, and the residue becomes viscid. To this, while warm, pure benzole may be added, until it is considered to be sufficiently liquid. It may then be used like fluid balsam, with or without heat, and is probably just as good. In both the above preparations it is necessary to use pure benzole, such as is procurable from the vendors of chemical drugs. —*C. J. M.*

Preparation of Diatoms.—In the Journal de Micrographie,"* Monsieur L. J. Brun, Professeur à l'Université de Genève, publishes a new process for cleaning diatoms, of which we give a translation: "I have devised the following process for the destruction of the endochrome and the preparation of diatoms. It is so convenient, and gives such good results, that I feel it a duty to devote a few lines to making it known. To a magma † of fresh diatoms still moist, add some crystals of permanganate of potash dissolved in a small quantity of water (1 part of the salt to 10 of water). If the diatoms are dry, pure, or mixed with earth or organic matter, moisten with a small quantity of a concentrated solution of the salt, and in which there are still some crystals in excess. The reaction of the permanganate must be continued for about twelve hours. It is sometimes desirable to remove the mixture to the bottom of a 100-gramme phial and then place it in a warm oven or in the sun. The phial must afterwards be half filled with water and a little calcined magnesia (about 0·50 centage) added. This must be allowed to act for two or three hours, occasionally shaking the contents. Now add one gramme every minute for ten minutes of pure hydrochloric acid. When the contents of the phial are bleached the process is complete. In order to facilitate the reaction, plunge the phial into hot or boiling water. The usual washing and decantation may now be employed; for the washings absolutely pure distilled water is imperatively necessary. In this process we have, first, the energetic oxidation of the endochrome by the permanganate and magnesia, afterwards the liberation of oxygen gas which acts as an oxydiser (comburant), and then the disengagement of the chlorine which acts as a bleacher. Doubtless it is to these multiplied and successive reactions upon the valves, both externally and internally, that the perfect cleaning of the silica is due. By this treatment the delicate species are not corroded, especially if before the addition of the acid a sufficient quantity of water is added. The surface of the valves having lost all its 'coleacterine' appears with all its brilliancy, and the minutest details, the striæ or puncta are clearly distinguished." I have for several years successively tried all the physical and chemical processes that have been published, and I am able to say that I have found none of them in which the results are so perfect and so uniform. I have not yet tried Professor Brun's method, but, theoretically, it appears to be a good one. I fear, however, that it will not prove so effective when much vegetable or animal matter is present as the old sulphuric acid and chloride of potash process.—*F. K.*

* "Jour. de Micr.," edited by Dr. Pelleton. Paris, No. 9, 1882.

† A crude residuum.

Talc.—Reading Saville Kent's recent work, I came upon the following passage. After giving objections to the use of thin glass as a cover for microscopic objects under high powers, that author says: "This substance, represented by ordinary talc, as extensively used for gaselier shades, may with a little practice be split into laminæ of such extreme tenuity that they may be blown away with the slightest breath, while for perfect evenness and transparency they will compare favourably with the finest manufactured glass. With the employment of these talc-films the investigation of Infusoria with the $\frac{1}{16}$, $\frac{1}{25}$, or even the $\frac{1}{50}$ inch objectives becomes a comparatively easy task. The material in question possesses the further considerable advantages of bending readily, and permitting the object glass to be brought close down on the more remote objects in the microscopic field, while it may be cut with the scissors to any required size or shape." (Man. Infus. i. p. 115.)—*C. A.*

"Studies in Microscopical Science."—Edited by A. C. Cole. Nos. 19, 20, and 21, of this important and helpful serial are devoted severally to

"The Lung of Sheep," "Section of the human Lung," and "Transverse Section of the stem of *Pilularia globulifera*." The coloured plates of each part maintain their high artistic character, and the slides sent out with the parts every week are excellent specimens both of neat mounting and section cutting. Unfortunately, in our last notice, we stated the price of the illustrative part and slide together was one shilling weekly. Instead of this the price is twenty-four shillings quarterly—a sum sufficiently low for value received, to leave workers still wondering how it is done.

THE POSTAL MICROSCOPICAL SOCIETY.—No. 3 Journal of this vigorous club has been published, containing several valuable papers by practical workers, among which we may mention those on the "Embryology of the Podophthalmatos," by E. Lovett; on "The Adulteration of Coffee," by J. S. Harrison; "A New Growing Slide," "Unpressed Mounting for the Microscope," "How to prepare Foraminifera," "Selections from the Society's Note Books," &c. All the plates in this number are very good.

JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY.—The October part of this Journal contains a very important paper (illustrated) by Dr. Aser Poli, on "Plant Crystals." The summary of current researches relating to zoology and botany (principally in vertebrata and cryptogamia), microscopy, &c., including original communications from Fellows and others, is unusually full and complete. We regard this as the best and most valuable part of the Journal.

ZOOLOGY.

LAND AND FRESHWATER SHELLS.—As no one has replied to A. Loydell's question in the September number, p. 214, I venture to do so. He inquires if certain recently added species are to be considered indigenous or not. It is premature to answer the question positively or negatively. Omitting the case of importation of *H. villosa* from Switzerland to Durham by Canon Tristram, I believe that *H. villosa*, *Cl. parvula* and *Cl. solida* have as yet been found in this country in only one locality in each instance. But suppose that in the course of the next few years, now that attention has been called to their presence, one of them, *Cl. parvula*, e.g., should turn up in several other widely separated localities, there would then be no reason to suppose the species other than indigenous, or at least we should consider it to have as much claim to that term (whatever it may imply) as *Cl. Rolphii* or *Cl. biplicata*. Meantime their names must be provisionally retained on our list, because they have been found in what, if speaking of larger animals, we should call a wild state. As for *H. aperta*, it has never yet been found alive in these islands, and its name should be expunged from the list.—*C. Ashford.*

COCHLICOPA TRIDENS, VAR. CRYSTALLINA.—I recently found this variety in the grounds of Dudley Castle, a locality that does not appear to have been before noticed. The type occurs there plentifully, in company with *Vitrina pellucida*, *Zonites fulvus*, *Carychium minimum*, &c.—*J. W. Cundall, Bristol.*

CAPTURE OF "APOLLO BUTTERFLY" (*Doritis Apollo*) IN DEVONSHIRE.—Is Mr. H. C. Brooke sure as to the species of the insect he refers to as "an Apollo butterfly," at p. 239 of last month's SCIENCE-GOSSIP? If no mistake has been made as to the identity of the insect, the capture is an exceedingly interesting one, and I am quite sure that all entomological readers of SCIENCE-GOSSIP would be glad to have further particulars. Will Mr. Brooke be kind enough to write a short note as to this, giving the name of the locality, and a short description of the insect, and the way in which its capture was effected?—*W. J. V. Vandenbergh.*

POPULAR NATURAL HISTORY.—Under the title of "Country Notes," the "Manchester City News" (which has always been noted for the prominence it has given to scientific news and reports of local societies) is now republishing from its own readable columns, in a neatly got up form, all the best papers, notes, and memoranda relating to natural history.

"THE BUTTERFLIES OF EUROPE," by Dr. Lang (London: L. Reeve & Co.). Part X. of this high-class work has just been published, containing four exquisitely coloured plates of butterflies of the genera Polyommatus and Vanessa.

MIMICRY IN THE PLUME MOTHS.—The following note from Dr. J. E. Taylor on this subject has just appeared in "Nature":—"I have not seen in any Entomological work an attempt to explain the well-known peculiar character of the wings of the plume moths (Pterophori). They depart so thoroughly from the rest of the Lepidoptera in having the wings cleft into so-called feathery plumes (although retaining the microscopic scales characteristic of their order) that we may be certain so marked a type must have been evolved along definite lines and for specific reasons. One species (*Agdistes Bennetii*) may be regarded as the first stage in the differentiation of these insects, and from this species we have successive modifications in the number of plumes up to *Alucita polydactyla*, where the ordinary wings are split up into no fewer than twenty-four. I have long thought this winged peculiarity is due to mimicry, the objects mimicked being the down or pappi of thistles and other composite plants. The commonest of the plume moths, perhaps, is the large white plume (*Pterophorus pentadactylus*), and all entomologists are acquainted with its peculiar drifting mode of flight, exactly resembling that in which a thistle plume is blown by the wind. The other day I followed what I took to be a drifting plume, for the sake of seeing what species it belonged to, and found it to be a specimen of this species of moth; so remarkably similar do the two objects appear when in motion. If the intention of the plume moths is to mimic the pappi of the winged seeds, we can understand why these insects do not fold the wings to the body when at rest, but seem to display them to the utmost instead. The fact that (according to Stainton) out of about twenty species of Pterophori larvæ of which have their food plant given, no fewer than ten feed on composite plants, or plants bearing plumed seeds, indicates that the resemblance of the winged insects to pappi must also be protective to females when depositing their eggs on plants which produce down, as well as when they are flying. It would be interesting to compare the different kinds of thistle and other down with the appearance of the various species of 'plumed moths' which thus appear to mimic them."

BOTANY.

NOTES ON THE DISTRIBUTION OF THE THREE FORMS OF LYTHRUM SALICARIA.—The plants being abundant in this locality, I made it my business to ramble up and down beside the river Cann, on the west of Chelmsford, between that town and Writtle, with a view to ascertain the relative numbers of its three forms, which I found mixed so evenly that it was hardly possible to gather a handful of the flowers without having them all. It differs much in this respect from some diœcious plants, of which each of the two sexes may be found in patches of considerable size, as of *Mercurialis perennis*, which spreads considerably under ground. *Lythrum salicaria*, though equally perennial, seems to have no means of increasing its numbers except by seed, so that every clump of the plant may be regarded as a distinct individual, and as it undoubtedly fertilised legitimately by insects waiting on it in a state of nature, each of the three forms would yield seed from which all the forms would spring. So they all grow together, and I found—long styled, 98; short styled, 113; mixed styled, 122.—*John Gibbs.*

SPIRANTHES ÆSTIVALIS.—Your correspondent J. Saunders, in a note on the above rare plant, says it did not grow in the spot mentioned in the New Forest guide book when he visited the bog last year. Now, although he thought he covered every square yard of ground, still, at least one square yard must have been left unsearched, for last year my brother and myself, after two hours of that exhilarating pastime, bog-trotting, suddenly came upon six nearly full specimens, apparently all that were there. It seems to me a great pity that such botanists as the lady referred to by your correspondent could not confine their energies to less rare plants. I imagine that as the individual who nearly eradicated the plant from its original station a few years ago was severely censured by the New Forest surveyor for so doing, some restraining power could be exercised over the labourers living in the vicinity, if under the "Woods and Forests," which they probably are; so that visitors to the bog could caution persons undertaking such a commission as your correspondent mentions.—*Theodore James.*

A NEW POTAMOGETON.—I sent you a few remarks on a new potamogeton, or at least a curious and abnormal form of pond-weed found by me in September of last year in a small pool, on the banks of the Wharfe at Linton near here. I at first took it to be *P. prælongus*, but, being somewhat uncertain, I showed the plant to Dr. F. A. Lees, who at once said that it was not prælongus, and who kindly looked through with me his collection and the Botanical works we had at hand, but without finding a description at all corresponding to the plant. A few specimens of the plant were forwarded by Dr. Lees to Professor Babington, who expressed himself dubious about it, but thought it a state of prælongus. Mr. A. Bennett, to whom specimens were sent, looked through the British and foreign specimens of *nitens*, *perfoliatus* and *prælongus* in Herb. British Museum, but found "nothing that matched the plant;" he, Mr. Bennett, also at Kew, "looked through Mr. Watson's, Mr. Borrer's, and the general collection, and a separate collection from North America, but found nothing there like it, and nothing so much like the plant as some U. S. A. and Caithness specimens that he had in his possession, and said that he referred it to *P. perfoliatus* as an extreme form." The leaves are all submerged, alternate, half clasping, entire, pellucid, willow-like midrib pink, and then not raised above the surface as in typical perfoliatus with three longitudinal nerves on each side and a few transverse reticulations. In a recent letter from Mr. Bennett, to whom I sent some of this year's plants, he says "the further and better developed specimen of the Linton potamogeton leaves no doubt that I rightly referred it to *P. perfoliatus*," and however indisposed I am to disagree with so good an authority, still, to my mind, the pink thin midrib, with at the most three or four nerves on each side, and the absence of smaller intermediate ones, and the altogether narrower leaves make it a very strongly marked var. of *P. perfoliatus*, if not altogether a different species. Unfortunately, I have not been able as yet to obtain the plant in fruit, as last year only one or two flower buds on very short peduncles were developed, and this year, although it has increased in quantity, I have not found a single plant making an attempt at fruiting.—*John Jackson, Wetherley.*

"Natural History Notes."—This excellent little periodical always contains good matter; among other papers now appearing we may mention Professor Boulger's "Hints on Commencing the Study of Botany," and Mr. T. Marshall's on "Plant Symbolism, as connected with the Early History of Mankind."

White Varieties.—Seeing that some interest is being taken in the Albino varieties of flowers by the readers of Science-Gossip, I forward a list of some which I have seen in this neighbourhood. Herb Robert (*Geranium Robertianum*), on the roadside near Brisco, and growing from a joint in the masonry of a sluice wall at Woodbank. Spiny restharrow (*Ononis spinosa*), on gravel beds in the Esk, near to the metal bridge. Small scabious (*Scabiosa Columbaria*), both white and pink varieties, Stainton banks, river Eden. Round-leaved bell flower (*Campanula rotundifolia*), St. Ann's Hill and Croglin. Rampion bell flower (*C. rapunculus*), hedge-side, near Harker, probably a garden escape. Heather (*Calluna vulgaris*) on Kingmoor, Bowness Flow, &c., generally to be found on all our moors and mosses in more or less quantities. It has appeared in several places this year where it was never known before. Centaury (*Erythræa centaurium*) near Bowness-on-Solway. Lousewort (*Pedicularis sylvatica*), on waste ground near Corby quarries. Red deadnettle (*Lamium purpureum*) grows in some quantities, mixed with the ordinary flower, at Barras Lonning Dalston. Forget-me-not (*Myosotis palustris*) not uncommon. Spotted orchis (*Orchis maculata*) Kingmoor Wood. I have also met with the double-flowered celandine (*Chelidonium majus*), and a very fine plant of the twayblade (*Listera ovata*) with three leaves.—*W. Duckworth, Stanwise, Carlisle.*

GEOLOGY.

Pebbles of the Drift.—Mr. W. J. Harrison, F.G.S., the science demonstrator of the Birmingham board schools, and whose excellent work on the Geology of the Counties of England and Wales we recently had much pleasure in calling attention to, is one of the hardest scientific workers in the midland counties. We beg to draw notice to a paper of his, recently published in the "Proceedings of the Birmingham Philosophical Society," on the "Quartzite Pebbles contained in the Drift, and in the Triassic Strata of England; and their Derivation from an Ancient Land Barrier in Central England." The title fully sets forth the scope of this important paper.

Evolution.—An article by Dr. James Croll, F.R.S., entitled "Evolution by Force impossible, a New Argument for Theism," written before his recent illness, will shortly appear in one of the quarterlies.

"The Hæmatite Deposits of Furness."—This is the title of a most elaborate and abundantly-illustrated paper by Mr. J. D. Kendall, C.E., F.G.S., recently read before the North of England Institute of Mining Engineers. The author enters into a detailed description of the various deposits, shows their form, position, and inner nature, gives their geological age (as older than the Permian), and then discusses their origin. In opposition to the received opinion, Mr. Kendall thinks that the Whitehaven deposits show clearly that the ore in them was not thrown down in caverns, for thin layers of shale are frequently continued through them from the walls on either side.

NOTES AND QUERIES.

Sparrows.—Myself and friend who have taken much interest in watching sparrows, have not noticed any variations in the colour of their beaks, only that which is usual between the male, female and young bird; the beak of the (1) being black, that of the (2) flesh colour, and that of (3) dusty brown, and close up to the mouth yellowish-white.—*Clara Kingsford, Canterbury.*

Preserving Crustacea.—In reply to T. D., the plan that I have followed with considerable success in the preservation of some thousands of specimens of Crustacea is a remarkably simple one, and may be briefly described. In the first place, specimens of half an inch or three-quarters of an inch in diameter need not be dissected or cleaned out, but may be dried and set at once. Larger specimens should (if they be crabs) have the upper position of the carapace carefully removed with a knife. In the case of the lobster forms, the thorax should be removed from the abdomen in the same way. Remove all the internal portions and wash thoroughly in cold, clean, fresh water. Should the carapace be a delicate or thin one, cotton wool of a suitable colour may be inserted in order to assist in keeping the natural tint of the animal. Now replace the carapace and any of the limbs that it has been necessary to remove for cleaning (small claws need not be cleaned out), and fix by means of a strong, clean cement. Set the specimen up with pins on a piece of soft pine, arranging the limbs, &c., in order for the cabinet, and place the board of specimens in a cool, dark spot, where the process of drying will go on evenly. This is the real secret of success, as a little heat or light will bleach the animals in a very short time. Crustacea should be set up soon after death, and should be well washed in fresh water or they will give in damp weather. If T. D. will communicate with me I shall be happy to assist him further.—*Edward Lovett, George Street, Croydon.*

A Field of Scabious.—The beautiful sight presented to me a few days since (September 7th) by a field at Claygate, near Esher, Surrey, almost full of *Scabiosa succisa* in bloom, led me to inquire into the various popular names which have been given to that well-known species of scabious. Of these, "blue cap" would seem to be one of the most appropriate. But "Devil's bit" is probably the commonest, and is supposed to be taken from the peculiar conformation of the root, branching off almost at the ground, and looking almost as if it had been bitten off at the bottom. Bit should therefore rather be bite (but of course the two words are originally the same). The French equivalent is "Mors du Diable," and the German "Teufelsabbiss." One would like to know whether another German term for the plant, "St. Peter's Cabbage" (St. Peterskraut), is in use in any part of England. Can any of your readers inform me?—*W. T. Lynn, B.A., Blackheath.*

SQUIRRELS IN IRELAND.—Having recently read the contents of SCIENCE-GOSSIP for March (No. 207), I beg to point out an error in the paper by Mr. George Dewar, in which it is stated that the squirrel does not exist in Ireland. It is generally admitted that the squirrel is not indigenous to this country. It seems to have been introduced into the county of Wicklow about the year 1815, where it has multiplied very much. More recently it has been introduced into other parts of the country. See Mr. Barrington's paper on this subject in the Scientific Proceedings of the Royal Dublin Society, Part vii. Nov. 1880.—*J. G. Robertson, Kilkenny.*

SCARCITY OF ACORNS.—During the summer holidays, I have had the opportunity to observe some thousands of oak-trees in a part of Surrey, and I have found but one single acorn. Will any one kindly explain this, and also tell me whether there is the same scarcity throughout the country?—*A. H. Fisher.*

LAND AND FRESHWATER SHELLS.—In reply to A. Loydall, who asks for the verification of certain species claimed to be British, I can give him the following information:—*Helix aperta* has been introduced into British lists on the strength of a dead specimen found at Guernsey in 1839. As a great deal of French produce is brought to Guernsey for sale, its introduction seems clear. *Clausilia solida* (one specimen) was stated to have been found at Stapleton, near Bristol, in 1870, but its reputed discoverer admitted to me that he had made an error, and that it was a foreign specimen. There are a few specimens in old British collections, which are all traceable, however, to the cabinet of Mr. Humphreys; but the evidence of their native origin is more than doubtful. There have been many supposed discoveries of *Clausilia parvula*, but they have always turned out to be dwarfed specimens of another species, and I do not know of an authentic specimen. Mr. Grant Allen, however, is said to have found several specimens at Kinver, near Stourbridge, some years ago, and there would be nothing surprising in its occurring in this country. *Helix villosa* is the latest addition to British land shells, three specimens having been found in 1873, and there is no doubt as to their identity. It is the only species of the four above-named that I think has any present claim to be inserted in British lists.—*J. T. Marshall, Cheltenham.*

RECENT CAPTURES.—(SCIENCE-GOSSIP, Sept. 1882, p. 209.) Not myself being an entomologist, but only a lover of nature, I cannot share in the gladness which you attribute to all entomologists at Mr. Enoch's captures of a rare bee. (SCIENCE-GOSSIP, p. 209.) Instead of merely identifying *Macropis labiata*, he impounded, as I understand you, every specimen he could see. I ask what possible end is served by this wholesale extermination of our rare visitors? Would not the simple identification of the bee, with a record of its observation, have answered every purpose? It is quite refreshing to read the notice from G. T. B. of terns being seen at Oxford, and to find no record of their being shot at (see p. 213). I might tell G. T. B. that one was shot about thirty years ago on the banks of the Ouse, about a mile from Stony Stratford, i.e. quite as far inland as those he saw.—*Arthur R. Graham.*

SLUGS.—A friend tells me he lately saw in a wood at Saalburg, near Homburg, several slugs fully six inches in length of a brilliant red colour. The head and tail were smooth, the central portion of the body being corrugated. Is it likely to be merely a variety of *Arion ater*, or is it a species peculiar to the Continent?—*K. M. K.*

PLANTAGO MAJOR.—On the 9th inst., whilst walking on the Sibbertoft road, near the church, I found growing near the ditch on the side of the road a *Plantago major*, bearing three stalks of the following dimensions:—14 in. to flower, $17\frac{1}{2}$ in. flowering spike $= 31\frac{1}{2}$ in.; 14 in. to flower, 18 in. flowering spike $=$ 32 in.; 16 in. to flower, 19 in. flowering spike $=$ 35 in. The leaves were very large, and marked with nine strongly prominent ribs. As I have never seen nor read of a plantago bearing such very high spikes, I consider it a subject worthy of record.—*J. Hobson, M.D., Tonbridge.*

WASP AND FLIES.—I write to state in reply to Mr. J. P. Smythe's question that I last week saw a wasp attack a large house-fly on the window pane in a house I was calling at. My attention was drawn to it by the lady of the house, who exclaimed, "Do look at that wasp, he is killing the flies," and I saw the creature seize a big specimen, cut off its head, and then proceed to eat its body. I killed the wasp, in order to see more closely what he had been doing, and found just the shell of the fly remaining. He had sucked out the contents, had made a hole in the under part of the insect's body, and extracted all the meat, leaving a fly case only. I have lately seen many fly heads on the window sills, and have no longer any doubt but that wasps have been acting the part of executioners and practical scavengers. I wonder why they leave the heads? It is generally said that a rat's head will poison a cat, and that the "lady" in a lobster's head is hurtful to man; perhaps a fly's head contains some injurious properties, and house wasps reject it.—*Helen E. Watney.*

BUDGERIGARS CHANGING COLOUR.—The origin of the domesticated canary having been lost in obscurity, it will doubtless be of interest to lovers of cage-pets to be enabled to trace the home breed budgerigars of the future back to their original stock in the boundless forests of Southern Australia; for few persons beholding for the first time a pale yellow specimen of the undulated grass parrakeet, would be able to identify it with the bright green bird so familiar to fanciers, and now generally known by the native Australian name of budgerigar, and to naturalists by that of *Melopsittacus undulatus*. Some eight years ago, a Belgian breeder of these birds had a pair (of aviary-bred descent for several generations) that produced a brood of young in which pale yellow was the predominant colour, and the characteristic undulations of the species were replaced by the faintest pencillings of grey. A couple of years afterwards, some of the descendants of these little birds were exhibited at the Alexandra Palace, where they attracted considerable notice, receiving an "extra first prize," and were readily sold for £6 a pair, about their weight in gold. The "sport" appears then to have passed into the hands of a well-known London dealer, who, by judicious management, has succeeded in obtaining a uniformly yellow bird, without a trace of its origin about it, excepting the pale blue cere of the male, and the dazzling white of the little spots on the throat, which in the ordinary budgerigar are cerulean blue. This dealer has also some pale green birds of the same species that are almost as large as a turquoisine. A blue variety of the undulated parrakeet has recently, I understand, been obtained in Germany; so that we may soon expect to have budgerigars bred of all colours, and so different in appearance from the parent stork, as to puzzle ornithologists unacquainted with their origin. I would recommend readers of SCIENCE-GOSSIP interested in the matter to pay an early visit to the establishment of Mr. Joseph Abrahams, 192 St. George Street East, London, who will be pleased to show them his yellow budgerigars, even if they do not spend a penny in the place.—*W. T. Greene, M.A., F.Z.S.*

WASPS AND INSECTS.—In reply to your correspondent Mr. J. P. Smythe, as regards wasps capturing insects, I may say I have often seen wasps seize flies on window-panes. I have also seen them on the wing.—*F. H. Parrot, Walton House, Aylesbury.*

NAME WANTED.—The bird observed by E. H. R. was probably the spotted flycatcher (*Muscicapa grisola*), though what little note this species has cannot be called "harsh." I have often observed the flycatcher stationed on an iron fence in a garden, darting off occasionally for flies, as E. H. R. describes, sometimes not returning to the same spot, but a foot or two farther on, and so in time traversing the whole length of fencing and back again.—*C. A.*

LARGE SLUG.—The slug described by E. H. R. is no doubt the *Limax maximus*, L. It is common in most parts, and, though harmless (as any other slug at least), is a great terror to servant-maids in back kitchens. E. H. R. will find an admirable drawing of this species in Reeve's "Land and Fresh-water Mollusks," p. 25, and should he meet with another specimen, I would advise him to place it on a half-inch stick, and, when the slug is extended to its full length, peer through the respiratory orifice on the right side of the animal with a lens, examine the chamber and try to make out the ramification of the blood-vessels on its surface.—*C. Ashford.*

NOTES ON MOLLUSCA.—In answer to your correspondent P. S. Taylor: "I have observed *Planorbis corneus* devouring egg-capsules of *P. vortex*. I do not think this can be from choice, and put it down in my case either from want of vegetable food or from its incessant habit (as with all semivalve shells) of rasping any surface it passes over. Anyhow, it is interesting." To "Arion" and to your "first correspondent," Caterham Valley and all the country between there and Box Hill produces *H. pomatia*, but I am grieved to say that, from my own experience and that of several Molluscan friends, it is becoming very uncommon in the first locality—owing, I fear, to an assiduous bird fancier not a hundred miles from Seven Dials. Both *Limax maximus* (black slug) and *Arion ater* are very variable in their colour, but *L. maximus* may be easily recognized by feeling the shell under the mantle. According to "Rimmer," *A. a.* is from 3 to 5 inches, and *L. m.* 4 to 6 inches."—*C. D. Sherborn.*

REASONING POWERS OF ANIMALS.—A friend has just related to me an incident which recently occurred in his household, which I think adds to the evidence in favour of reasoning powers, to some extent, in the brute creation. My friend has a cat which has acquired the habit of letting itself in at the back door of his house by pressing down the thumb lever of the latch with its forepaws and so opening the door. Puss is very fond of sparrow hunting, and has selected one secluded corner of the garden for a hiding-place, from whence to pounce upon any adventurous bird, and, one day, during the spring, she was in ambush laid, when her son (a fine lively young cat) appeared on the scene, and proceeding across the garden, mewed to be let into the house. His mother evidently thought this procedure unlikely to hasten the advent of the sparrows, and rising from her lair, crossed to the door, which she opened in her accustomed manner, letting in her beloved, though, at the time, troublesome son. She then returned to her old position of watchfulness. The action of the cat exhibits, to my mind, no mean degree of intelligence, and is therefore, I think, worthy of record.—*Baker Hudson.*

A LITTER OF WILD RABBITS.—During the month of September a wild rabbit has littered beneath one of the point rod covers, in the upper goods station yard at Brighton. Engines and trucks are continually being shunted over the cover beneath which the old rabbit and her little ones have established their home. Yet, when all is quiet, they venture out and graze upon the banks of buffer beams in close proximity. They are much petted by the shunters and others engaged in the yard.—*F. Farrant, Brighton.*

HENS AND HORSEHAIR.—The lady is the subject of a hoax. It reminds me of an incident that occurred to a friend of mine some years ago. Suspecting that he did not receive the due quantity of eggs from his poultry, he privately marked several eggs and replaced them in the nest, but the thief was too wily to be thus caught, so he adopted the following plan. With a fine sewing-needle he pierced the end of a fresh laid egg, and inserted a long black horsehair, closing the puncture with a particle of white wax; replacing the egg, he kept his own counsel. Some short time afterwards when talking to his gardener about fowls, the latter said, "Hens were queer birds," as his wife had even found horsehair in their eggs. "Oh," said my friend, "now I know; it was myself who put the horsehair in, and you who took the eggs." So the thief was discovered.—*T. W. Henson.*

WHITE CAMPANULA.—One of your correspondents, C. E. J. G., mentions the occurrence of white flowered specimens of *Agraphis nutans* (wild hyacinth) and *Campanula rotundifolia* (hairbell). I beg to state that a white *Agraphis nutans* was gathered near here this summer; and I have gathered white-flowered specimens of *Campanula rotundifolia* in plenty at Tilmire near York, and Rievaulx Abbey near Helmsley.—*Alfred Waller, York.*

HOLLY BERRIES.—Several fine hollies growing wild in a strip of uncultivated ground on my glebe (near Lurgan), retained their unusually large cymes or bunches of berries all this year, till the 20th of September, on which date the first flock of missel thrushes passed this way and cleared them off. I attribute such uncommonly late holly berries to the absence of blackbirds, which were all but exterminated by the severe winters of 1879–80 and 1880–81, and the wet cold spring and summer of 1882, which retarded the fruit ripening.—*H. W. Lett, M.A.*

DEATH'S-HEAD MOTH.—I have lately seen a large death's-head moth which was caught by a Sheffield gentleman whilst on board one of the Grimsby fishing boats, about two hundred miles off the Norfolk coast in the North Sea. They were eight days out from port, so that it is not likely the moth had been on board all the time, and unless it had flown off some passing ship it seems a very long flight for so heavy a moth.—*Thomas Winder, Sheffield.*

ACHERONTIA ATROPOS AT NORWICH.—There were seven or eight specimens of this rare moth caught at the electric light in this city between the 12th and 18th of September. They were all very good specimens, and I think all males. Mr. A. G. Hewitt also found one by the river side.—*E. P. Dyball, Norwich.*

NAMES WANTED (p. 238).—The name of the bird about which E. H. R. inquires is the spotted fly-catcher (*Muscicapa grisola*), a common and most interesting species.—*W. H. Warner, Standlake.*

CURIOUS CONDUCT OF A DOG.—Allow me to thank Dr. Keegan for his note in reference to the curious conduct of a dog recorded by me in the June number of SCIENCE-GOSSIP. Though failing to see eye to eye with him, I have read his communication with much pleasure and interest. I am unwilling again to trespass on your space; but may I ask in what way Dr. Keegan distinguishes between actions resulting from association of ideas, and those that are confessedly guided by reason? He makes a somewhat sweeping assertion that "no animal other than man can speak, or does possess the power of thinking about absent objects by means of signs." In what way, then, does association of ideas operate in the lower animals if they have not this power? The altered expression on a boy's face—granting that his theory holds good in this respect—is, to the dog, as much a sign as written symbols are to man. It is only by association of ideas that written or printed characters convey any signification to our minds; yet, while it is granted that the power to interpret these involves an effort of reason, it is denied that the similar power on the part of the lower animals is derived from the same source. Then as to the power of speech, it is at least open to question whether they are not endowed with this; true, they cannot express their thoughts to us; but does it follow that they cannot do so to one another? The observations, not only of the uninitiated, but also of careful and scientific investigators, lead us to favour a different conclusion.—*Alex. Geddie, M.A.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

M. G.—Lowe's "Our Native Ferns" (2 vols.) is the best we have. Every species, and many of the varieties. It contains 79 coloured plates and 800 woodcuts. The price is, we believe, £2 2s.

W. G. W.—The plant is not a Dianthus, although belonging to the same order. It is the soapwort (*Saponaria officinalis*). The other is *Geranium sylvaticum.*

F. FARMER AND OTHERS.—We have received several notes relating to the capture of the Death's Head Moth, which it is perhaps not necessary to publish, but they prove that this insect has been peculiarly abundant this season.

JOHN SIMM.—Accept our best thanks for the coal fossils.

F. H. PARROTT.—Your fossils are as follows: No. 1, Portion of flattened stem of Encrinite; 2, *Belemnites minimus* (Gault); 3, Arca; 4, *Producta Martini* (young, carb. limestone); 5, young of Ostrea; 6, Cyrena (?); 7, Cyclocyathus (coral, Gault); 8, obscure; 9, *Inoceramus sulcatus* (Gault).

E. B. (Folkestone).—1. Please look over our advertisement sheet. 2. The shamrock, as used in Ireland, is a species of trefoil, equally common in England. 3. The bluebell is the Endymion you refer to. 4. Examine Dr. Hooker's "Student's Flora," there are a great number of British roses.

R. A. BULLEN.—The mulberry leaves are a later growth, caused by abundant flow of sap; it is frequent in other trees this autumn.

E. A. D. (Hebden Bridge).—*Atrichum undulatum*; it is very closely allied to the one you name.

C. C. H. (Greetland).—Only one species came to hand, which is the *Stachys arvensis*, L. The Lamium is a much larger and coarser plant.

J. S. R. (Bridport).—You are quite correct, it is a curious transformation; the corolla is formed out of the pistil, exactly the same as in the flowering cherry. Examine the latter.

H. R. A. (Beulah Hill).—First, mosses: 1, *Atrichum undulatum*; 2, *Hypnum rutabulum*; 3, correct; 4, a form of No. 2. Flowering plants: A, *Epilobium hirsutum*; B, *Geranium sanguineum*; C, *Trifolium filiforme* (?); D, *Cardamine sylvatica*; E, *Eupatorium cannabinum*; F, *Agrimonia eupatoria*; G, *Pulicaria dysenterica*; H, *Ononis spinosa*; M, *Mentha aquatica*, but it is difficult to form an opinion from a single leaf.

E. B. WRIGGLEWORTH.—The fossil looks more like *Modiola carinata* than the *caudata*; but we should like to see another specimen or two before determining. We have not heard of either having been found in the Yorkshire coal-field before.

EXCHANGES.

WANTED, a few gatherings of marine diatoms, especially of the genus Pleurosigma; also a small quantity of Cuxhaven mud. Mounted objects in exchange.—C. V. Smith, Carmarthen.

WANTED, a correspondent on the Pacific coast of North America with a view to microscopical exchanges.—C. V. Smith, Carmarthen.

OFFERED, L.C., 7th ed., 99, 121, 457, 533, 676, 737, 912, 924, 1349, 1359, 1360, 1361, 1362, 1412, 1436, 1458, 1478, and others, in exchange for English plants. — Send lists to P. Ewing, 97 McAslin Street, Glasgow.

BOTANICAL duplicates dried. L.C., 7th ed., 6, 10, 26, 40, 127b, 153a, 157 mountain var., 162, 248, 254, 288, 296, 297, 305, 351, 374, 386, 394, 406, 506, 539, 548, 550, 560, 726, 859, 868, 824, 825, 871, 891, 932, 936, 1004, 1040, 1051, 1198, 1209, 1276, 1281, 1306, 1330, 1359, 1413.—Rev. M. Hick, Staindrop, Darlington.

SCOTCH "Disruption Worthies," by Wylie, complete in fifteen 2s. clean and perfect parts. Wanted, micro slides, accessories, or offers.—Morrison, 148 Clarence Street, Bolton.

ROSES, brambles, and other good things in exchange for plants or birds' eggs.—Send lists to J. W. White, Clifton, Bristol.

OFFERED, Messer's "British Wildflowers by Natural Analysis," in exchange for "The Field Naturalist's Handbook," by Rev. J. S. Wood. Also, what offers for a white Peru cabinet to hold 100 micro slides flat?—F. Bewlay, Vine Street, York.

WANTED, specimens of English palmated newt, edible frog, living or in spirits; also foreign amphibia, in spirits, in exchange for birds of paradise and other birds' skins, &c.—G. E. Mason, 6 Park Lane, Piccadilly, London.

OFFERED, L.C., 7th ed., 1, 40, 125, 163, 165, 259, 560, 585, 591, 677, 731, 946, 974, 1031, 1059, 1072, 1258, 1327, 1348, 1619, 1605. Send lists. Plants or coleoptera.—W. G. Woollcombe, The College, Brighton.

"RAMBLES IN SEARCH OF SHELLS," by J. E. Harting, and "Manual of the Land and Freshwater Shells," by W. Turton, revised by Dr. Gray; both equal to new, for British marine shells or fossils from red crag.—A. Loydell, 10 Aulay Street, Ossory Road, S.E.

LONDON CAT., 146, 184, 237, 556, 577, 706, 730, 913, 929, 1140, 1274, 1280, *Tetragonolobus siliquosus*, *Plantago arenaria*, *Nigella arvensis*, offered in exchange for good fronds in fruit of Nos. 1603, 1607, 1613, 1614, 1616, 1617, 1622, 1623, 1625, 1626, 1630, 1631, 1643, 1647.—J. Tempère, Storrington, Sussex.

OFFERED, slides of plates of a rare species of Thyone, *Grantia compressa*, *Clione celata*, &c. Wanted, British marine shells or histologial slides. — Dr. Keegan, Holywood, near Belfast.

For slide of beautiful capitium of *Stemonitis fusca* (Myxomycetous Fungus) send good slide to J. G. Patterson, 2 Dalrymple Crescent, Edinburgh.

Wanted, Science-Gossip for 1875, unbound, clean copy. D. Adamson, Watson Street, Motherwell, N.B.

London Cat., 7th ed., 859 for any of the following: 191, 626, 934, 939, 1041, or any of the rarer British orchids.—Alfred Waller, 17 Low Ousegate, York.

Wanted, correspondents in North and South America, the Continent and India, for the exchange of plants.—A. E. Lomax, 55 Vauxhall Road, Liverpool, England.

British birds' eggs (list by post) for human anatomical slides. Best offer received in four days taken.—A. Downes, 7 Castle Street, Reading.

Offered, large melon shells from China in exchange for smaller shells, also a few specimens of *Turritella terebra* and *Ranella crumena*.—A. E. Tucker, 53 Alma Road, Clifton, Bristol.

Have some well-seasoned genuine bog oak, as black, and almost as hard, as ebony, suitable for turning.—Rev. H. W. Lett, M.A., Lurgan.

Wanted, specimens of foreign tree stems, of 3" diam., and about 2" thick.—Rev. H. W. Lett, M.A., Lurgan.

For leaf of *Onosma Taurica* send other micro material or stamped envelope.—Dr. Morton, New Brompton, Kent.

Exchange wanted for some surplus books on natural history subjects.—Dr. Morton, New Brompton, Kent.

Duplicate British land, freshwater, and marine shells for exchange. Wanted *Pupa ringens*, *Vertigo alpestris*, *angustior*, *minutissima*, *pusilla*, &c.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

Duplicate British birds' eggs to exchange, including cittis warbler, white stork, spotted crake, golden oriole, capercaille, &c., for American eggs or good British. Lists sent.—A. J. Burrow, Hope House, Hanover Square, Leeds, Yorkshire.

Foraminifera, recent, and from the upper lias of Ilminster, in exchange for others.—F. W. Millett, 13 Milner Square, London, N.

Cassell's "Shakespeare," illustrated by Selous, notes by Cowden Clarke, 3 vols, fo. half morocco, and "Bible Educator," 4 vols. in 2, 4to., half calf, last editions, equal to new, in exchange for $\frac{1}{8}$th objective, physiological, biological, or geological slides.—R. McCully, jun., 88 Wordsworth Street, Liverpool.

Murex lenispina, Cerithium, Bulla, &c., from Mediterranean and India, and about thirty-five species of British land and aquatic shells. Wanted, British or foreign shells.—A. Jenkins, 17 Mornington Road, New Cross, S.E.

For exchange, handsome mahogany micro-cabinet, holds 500 slides, also collection of British mollusca, 1200 specimens, fossils, minerals, rocks, micro-slides and books. Wanted, a good microscope.—E. Wilson, 18 Low Pavement, Nottingham.

Duplicates: Aglaia, Semele, Carpini (males), *B. quercus*, (male), *Margaritaria dispar* (bred), *Graminis gamma*, Piniarias, Proboscidalis, *Chrysistis meticulosa*, Stagnalis, Nymphaelis, larvæ of fuliginosa. Desiderata: Æsculi, Ligniperda, Gonostigma, *Fasciaria dolobraria*, *Syringaria tiliaria*, erosaria, hispidaria, roboraria, sicula, lamula, unguicula, bicuspis, Furcula, bifida, Fagi, nubeculosa.—J. Smith, Kilwinning, Ayrshire.

Exotic butterflies for exchange: *Papilio arcturus*, Hector, Demolous, Agamemnon, Merope, Protesilaus, Sesostris, Helenus, *Danais alcippus*, *Hebomoia glaucippe*, *Dia. bolina*, Anthedon, *Minetra gambrisius*, *Cethosia cyane*, *Limenitis procris* (Java), *Precis ida* (Java), *Euryeus cressida*, *Morpho amathonte*, fair; Cypris, fine; *Urania rhypheus*, fine; *Pandora hypochlora*, fine; *Attacus atlas*, and many others. Wanted also, loan of Cramer's "Papillons Exotiques" in return for loan of Hewitson's "Exotic Butterflies."—J. C. Hudson, Railway Terrace, Cross Lane, Manchester.

Duplicates: Edusa, Paphia, Aglaia, Adippe, Euphrosyne, Atalanta, *Cardui galathea*, Hyperanthus, Alexis, Corydon and Linea. Desiderata: Hyale, Cratægi, Sinapis, Cinxia, Athalia, Polychloros, Sibylla, Iris, Cassiope, Thecla, Ægon, Adonis, Alsus, Lucina, Alveolus, Tages, Comma, and Actæon. —G. B. Rawcliffe, 14 Godley Street, Burnley, Lancashire.

"Great Industries of Great Britain," 3 vols., unbound, new, in good condition, for Babington's "Manual of British Botany," and Rev. C. A. Johns' "Flowers of the Field," or Hooker's "Student's Flora."—R. P., 20 Castlegate, York.

A first-class one-tenth wide angle objective, with correction adjustment, by Ross, London, in first-rate condition. What offers?—T. Forty, Market Square, Buckingham.

Wanted, any parts of Cassell's "European Butterflies and Moths" in exchange for Lepidoptera, &c.—R. Laddiman, Upper Hellesdon, Norwich.

Wanted, good gatherings of micro pond organisms for exchange. Collectors wanted in Louth and Mablethorpe district. —E. Wade Wilton, Microscopist and Naturalist, Northfield Villas, Leeds.

A selection of well-mounted double-stained vegetable sections, also some selected Desmids, all on ground slips, in exchange for good works on natural history.—Chas. J. Watkins, King's Mill House, Painswick, Gloucestershire.

Trigonia signata from inferior oolite for other trigonia or corals.—James Windoes, Chipping Norton, Oxfordshire.

Wanted, good mounted slides of *Volvox globator*, *Noctiluca miliaris*, sting of nettle, sections of human skin, nerve, voluntary and involuntary muscle, longitudinal sections of teeth, adipose and connective tissue, transverse sections of artery, and other objects; also all kinds of unmounted material. Exchange, first-class slides.—F. R. Martin, Grendon Lodge, Clevedon.

Twelve species of marine zoophytes for mounting; also *Nummulites variolarius* and *N. lævigatus*, and other Eocene fossils.—For list apply to G. W. Colenutt, 48 Union Street, Ryde, Isle of Wight.

Duplicates: *Io*, *atalanta*, *Cardui*, *galathea*, Cardamines, Brassicæ. Desiderata: Sibylla, Hyale, Betulæ, Artemis, Villica, Monacha, Prodromaria, and many others.—J. Bates, Orchard Terrace, Wellingborough.

What offers for some beautiful Brazilian beetles, over 600 genuine foreign stamps, and a number of science and natural history books? Wanted, books on botany and on coleoptera, or British specimens of plant and coleoptera.—W. G. Woollcombe, The College, Brighton.

Xenodochus carbonarius, *Phragmidium mucronatum*, *P. bulbosum*, &c., unmounted, for other fungi.—H. T. Sippitt, Saltaire, Bradford, Yorks.

Wanted, recent shells, crag, London clay, Cretaceous, Oolitic, Lias, Rhætic, or Devonian fossils. Will give Silurian, Carboniferous, and Devonian in exchange.—Send lists to C. A. Barber, 16 West Brampton, Newcastle, Staffs.

"Midland Naturalist," vols. i., ii., and iii., half-bound, leather, vol. iv. in parts, as issued, in exchange for Irish archæological works.—J. Smith, jun., 63 Legh Street, Warrington.

Wanted, entomological correspondents in southern Europe and North and South America for the exchange of insects.—F. A. Skuse, 143 Stepney Green, London, E., England.

Student's microscope, two eye-pieces, two objectives (1½ in. and ¼ in.), about 100 slides and turntable. Exchange offers to Rev. W. H. Skau, 49 Mayfield Road, Dalston.

Lophopus crystallinus and bell flower animalcule. A splendid gathering sent on receipt of six stamps to defray postage.—W. T. McNelly, 8, Patchett Street, Stretford Road, Manchester.

BOOKS, ETC., RECEIVED.

"Science in Short Chapters." By W. Mattieu Williams. London: Chatto & Windus.

"Journal of the Royal Microscopical Society." October.

"Proceedings of Bristol Naturalists' Society."

"Land and Water."

"Northern Microscopist."

"Midland Naturalist."

"Natural History Notes."

"Country Notes."

"Scottish Naturalist."

"American Naturalist."

"Canadian Entomologist."

"Bulletin of the Torrey Botanical Club."

"Cosmos: les Mondes."

"Science pour Tous."

"La Feuille des Jeunes Naturalistes."

"Revista."

&c. &c. &c.

Communications received up to 13th ult. from:—J. H.—G. C. D.—M. G.—Dr. C. C. A.—J. A. W. O.—A. M. —C. J. M.—T. J.—J. O. B.—C. V. S.—R. A. B.—P. E.—T. M.—J. W. W.—E. J. G.—E. A. D.—Dr. J. C.—J. M. H. —F. K.—G. V. V.—J. G.—B. H.—T. B.—C. A.—H. W.—G. E. M.—F. B.—W. G. W.—C. A. S.—E. D. M.—W. T. B.—F. H. P.—Dr. J. N.—Dr. P. Q. K.—T. W.—A. W.—J. G. P. —T. W. H.—W. B.—C. J. M.—J. S.—F. F.—F. C.—A. L.—J. T.—A. E. L.—A. D.—E. P. D.—C. P.—H. W. L.—N. P.—D. A.—A. E. T.—E. W.—W. A. P.—C. A.—Dr. J. M.—J. W. C.—A. J. B.—A. J. D.—R. M. C.—J. J.—A. J.—T. F. —J. M. C.—W. J. V. V.—W. O.—R. P.—R. Y. G.—R. L.—J. B.—E. W. W.—R. M. W.—G. W. C.—G. B. R.—E. A. F. —E. B. M.—C. J. W.—F. R. M.—J. C. H.—A. G.—C. C. H. —F. A. S.—J. S., jun.—J. B.—W. H. S.—H. T. S.—E. C.—W. H.—W. D.—E. J. G.—C. A. B.—J. B.—&c.

THE PRODUCTION OF SOUND BY CRICKETS.

By HENRY J. BACON.

SOME TIME since there was an inquiry as to the means by which the cricket produces the sound which is so familiar to us. The answers given by correspondents did not appear to me to be satisfactory. One answer was simply a quotation from an author, one of those I shall mention presently. The query awakened in myself a desire for the same information as to the instrument which causes the sharp stridulous sound—to many affording a kind of pleasure as associated with thoughts of domesticity, whilst, to others, the incessant repetition of the same shrill sound gives great annoyance. In course of time, an opportunity of investigating the matter occurred. A chirruping, gradually increasing in loudness as days passed on, drew my attention to the fact that a colony of crickets had evidently migrated over my garden wall, and was advancing to take possession of comfortable quarters for the winter. First, I traced them to a dust bin, and from time to time caught glimpses of them at night by means of a lantern. Having captured four, they were placed in a small box, where, in the course of a few hours, if memory fails not, I found one male half eaten, and another male partly dismembered, two females remaining alive and intact, to whom suspicion pointed as the more ferocious and powerful, unless there had been a fight between the others in the presence of and for the possession of the fair spectators. In the meantime, I had tracked a chirruping male into a cranny near a fire-grate, where, for the space of about a quarter of an hour, I could steadfastly watch him by the aid of a light. The first thing that struck me was that the legs remained perfectly still the whole time he was repeating the sound. Satisfying myself that the legs did not conduce to the production of sound by any motion of theirs, I directed next my attention more particularly to the elytra, which I saw to be in a constant state of vibration, strongly reminding me of the appearance presented by the wings of some moths when a light is thrown upon them whilst they are at sugar, with this important difference, that in the case of the moth the vibration of the wings is in a vertical plane, whilst, on the other hand, the elytra, or wing cases of the cricket, were rapidly vibrating in a horizontal plane, opening and shutting to and fro so incessantly as to confuse the eyes—similar to the haziness produced by the vibrations of the prongs of a tuning-fork when struck. Having observed this obliging creature until I thought no more information could be obtained by watching him, I next proceeded to make a post-mortem of one of the others. The elytra are about thirteen millimetres in length, 7 millimetres across the widest part, convex-concave, somewhat resembling a scoop, the outer edge being turned down at right angles about one-third from the outer margin, forming a keel. Across the upper third of the elytra runs the file, a horny ridge resembling a fine hair. This commences near the outer margin, reaches to the middle, slightly slanting upwards, then curves at almost right angles towards the point of attachment of the elytra.

From the margin to the commencement of the bend, it is comparatively uniform in density, thickness, and colour. Although the elytra are concave on their under-surface, yet the ridge is elevated both by its thickness and also by a corresponding depression in the upper surface. The teeth are about 230 in number, larger, and thus fewer in a given space, in the middle portion of the ridge. They are inclined forward, resembling tiles superimposed, presenting their edges towards the inner margin of the elytron; thus the most friction occurs when the motion of the elytra is to shut them. Each tooth, more particularly those occupying the central portion of the ridge, that is the largest teeth, have projections on each side; these projections would thus be the most elastic portions, and would of course vibrate the most freely. I have met with a few statements as to the method by which the sound is produced. Dr. Carpenter, in the "Microscope," says "the sound-producing apparatus consists of the 'tympanum' or drum, which is a space on each of the upper wings, scarcely crossed by veins, but bounded externally by a large dark vein, provided with three or four longitudinal ridges, and of the 'file' or 'bow' which is a transverse horny ridge in front of the tympanum, furnished with numerous teeth, and it is believed that the sound is produced by the rubbing of the two bows across each other, whilst its intensity is increased by the sound-board action of the tympanum." Dr. Brewer, in his treatise on "Sound," says "the merry 'hearth song' is produced by the attrition of the anterior pair of wings against each other. One of the wing cases has its edge notched or indented like a file or delicate saw, and this shard is made to pass over the shard or sheath of the opposite wing. The sound thus produced is augmented by resonance from a certain part of the wings, surrounded by strong nervures, which stretch the thin membranes so tightly that they act like a drum head." Whilst in a supplement or notes to a Natural History of Insects by Cuvier, it is stated "when he wishes to make himself heard he raises his elytra so as to form an acute angle with his body. Then he rubs one against the other with a horizontal and very quick motion. The elytra of the male are of a drier and more elastic nature, which renders them fit to excite by friction a sound similar to that produced by the rumpling of parchment." Now I would remark that as the elytra vibrate in a horizontal plane, the two "files" cannot be rubbed together, because one elytron must necessarily pass under the other, and of course both concave surfaces being turned downwards, the two files can never come into contact. This will be evident if we imagine the "files" being placed across the palms of the hands, and one hand passed over the other. None will suppose one of the elytra to be twisted round during the performance. It will be observed that Dr. Brewer describes aright the motions of the "shards," but is in error, as I think, concerning the production of the sound—or perhaps I should say obscure in the description of the apparatus. We may conceive it possible that the edge of one elytron might by passing under the other rub against the ridge, but the "file" of the other would escape friction by similar means. Besides, the edges are smooth. With regard to the statement in the supplement, the assertion that the elytra are raised from the body is correct. This is necessary to allow a greater freedom of motion.

This elevation also, it will be perceived, suffers them to overlap one another to the extent of about one-eighth more of their width, i.e., the entire surface at the lower end, by reason of their bent portion or sides clearing the body, thus removing that check to their free horizontal motion. But the simple statement that the sound is caused by friction of the elytra against each other, does not fully explain the matter; because, as before remarked, but one of the files can be rubbed by its companion elytron; against what then must the other be rubbed? It does not seem likely there would be disparity in the actions. Even if the former supposition, namely, that the edge of one elytron rubs against the other, be imagined; yet it is improbable it could cause much friction, because the edges are curved downwards, so that a blunt rounded edge is presented by each elytron. Thus it could only happen when they were placed vertically that the edge of one could scrape the file of the other. As,

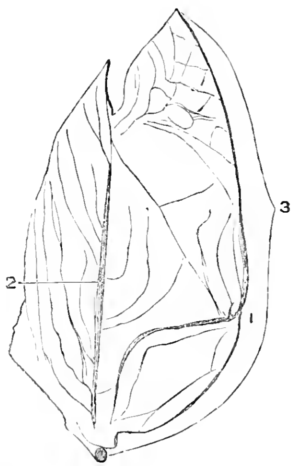


Fig. 186.—Magnified drawing of elytron of Cricket, showing the "file" placed upon the under surface; sketched by camera lucida. 1. The "file;" 2. Edge formed by the turned-down side; 3. Inner margin.

however, I am sure they vibrated in a horizontal plane, it was necessary to seek for some other means whereby friction of both ridges could take place simultaneously, and in a similar manner. The only instruments, from their position capable of accomplishing this purpose, would appear to be the two lower wings. These have several longitudinal ribs, which, when the wings are folded or shut, present by their approximation a row of ridges over which during the vibration of the elytra the files pass to and fro. They certainly are not very ridged, but are strong and elastic, and must be accepted as playing the part of stationary "bows." I say bows, because evidently the comparatively strong elastic parchment-like elytra must be the sound-boards—"drum" of some persons—of these musical instruments. If a number of fine and closely-placed lines be ruled by means of a diamond upon a piece of copper, and a needle be rubbed briskly to and fro across them, a shrill sound is produced, increasing of course in pitch and also in intensity with the greater rapidity of motion. But I doubt whether a sufficient quickness of motion could be given by the hand so as to produce the pitch in sound of the cricket, that requiring at least 24,000 vibrations a second. We may fully comprehend that a shrill sound could be produced by means of the metal or by the "Siren," but looking upon the almost microscopic nature of the cricket "file," it appears hard to believe that can be the principal instrument concerned in the production of the loud and shrill sound, yet it is generally conceded that such is the case. Although I have satisfied myself as to the instrument used by the "cri-cri," as the French name the insect, yet my wonder and admiration is but increased by the examination, and I shall listen to the shrill note with undiminished interest.

THE ORIGIN OF OUR VERNAL FLORA.

THE following remarks on this interesting subject have just appeared in "Nature," by Dr. J. E. Taylor. It is usual to assign an Arctic origin to our mountain flora, and floral comparisons and statistics fully bear out this brilliant generalisation. It is formulated that height above the sea-level is climatally equivalent to northern latitude. This is an assumption that flowering plants are largely conditioned by heat. Thus latitude and oreographical habitats are more or less equal.

Might I introduce another element into this question? Seeing that temperature is so largely influential in explaining the distribution of flowering plants, it occurs to me that not only may height above the sea-level answer to northern distribution, but seasonal occurrence as well.

All botanists must have been struck by the fact that the earliest plants to bloom among our vernal flora are genera peculiarly Alpine. In some instances (as with *Chrysosplenium oppositifolium* and *C. alternifolium*) the species are identical. These latter plants blossom with us in March or April; within the Arctic circle not until June and July, and even so late as August. Thus, with them, seasonal blossoming is equivalent to northern altitude, as regards the thermal conditions under which they flower. The generic names of all our early flowering plants are those pre-eminently Alpine and Arctic in their distribution—Potentilla, Stellaria, Saxifraga, Chrysosplenium, Draba, Ranunculus, Cardamine, Alsine, &c. I contend, therefore, that our vernal flora is explained by the fact that their seasonal occurrence, as regards temperature, is equivalent both to height above the sea-level and northern latitude. In every instance it will be found that the blossoming of the species of the above genera necessarily takes place, in Great Britain, two or three months earlier than within the polar circle. May we not therefore contend that we owe our English vernal flora to the same causes as distributed our English Alpine plants; and that they are as much protected by being able to flower earlier in the year, as if they had been located on the tops of high hills and mountains?

The power to endure cold and wet displayed by many members of our vernal flora is very remarkable. Thus *Ranunculus bulbosus* and *R. acris*, *Stellaria media*, &c., are frequently found in flower all through the winter, unless the season be extra cold. Many other early bloomers among our common flowers are also remarkable for their durability, whilst the late flowering plants are equally noticeable for the short space during which they bloom. This indicates a hardihood on the part of our vernal flora which cannot be explained except by reference to the climatal experience of the species. Some of them, as the groundsel and chickweed, may have exchanged an entomophilous for an anemophilous habit, or have become self-fertilised by the change.

Again, it must have been observed that many of our early flowering plants display a tendency towards a seasonal division of labour. All of them either flower before they leaf, or show a tendency to do so, as with the coltsfoot (*Tussilago farfara*), the crocus (*C. vernus*), the snow-drop (*Galanthus nivalis*), &c. Even the violets (*Viola odorata* and *V. canina*), the daffodil, primrose, cowslip, &c., although they in part leaf when they flower, develop leaves much more abundantly after flowering than before, thus showing an inclination towards dividing the period of active life into two distinct stages—the reproductive and vegetative. Every one knows how completely this has been effected by the meadow saffron (*Colchicum autumnale*). My impression is that this early flowering tendency is a survival of the habit these plants had to blossom under more rigorous climatal conditions; in short, that our vernal flora must have the same origin assigned to it as an Alpine; that it has survived through being able to bloom at an early period of the year at low levels, instead of flowering at a later season higher up, above the sea level; protection and advantage being secured in both instances.

YOUNG FROGS.—I see that in SCIENCE-GOSSIP for September 1st, 1882, A. H. Fisher states that he was unable to keep young frogs longer than three weeks. I have kept frogs after the tadpole stage for ten weeks in confinement, feeding them four or three times a day with aphides or raw meat, placed on the point of a knitting-pin. They grew but little; and after ten weeks I placed them in the garden at the end of July 1881. Seven are still in the garden, very tame, and about an inch and a half long (exclusive of legs). These frogs were hatched from spawn in an aquarium.—*F. Jewell.*

NOTES FOR SCIENCE CLASSES.

[*Continued from page* 249.]

Part IV.

COMPARE the longitudinal section of fern stem (fig. 187) with the transverse section, note the fibro-vascular bundles; they are largely developed; the xylem contains the scalariform vessels, and is surrounded by soft phloem. The apex of the stem and root do not always form an apical cell, hence, branching is rare; it is never axillary, but always dichotomous.

No. 1 is a layer of dark yellowish cells, or sclerenchyma; 2 is the fundamental, or ground tissue; then we come to the fibro-vascular bundle; 3 is the phloem portion surrounding 4, or the xylem of scalariform vessels.

The section is seen to be covered with hairs on the epidermis; stomata are found on the epidermis above ground. Take a small portion of the section adjoining the phloem, beneath a higher power, to find the *sieve-tubes* (fig. 188). No. 2; observe carefully their position and construction; they are placed between the phloem, No. 1, and xylem, No. 3. Also note with care the structure of the scalariform vessels of the xylem.

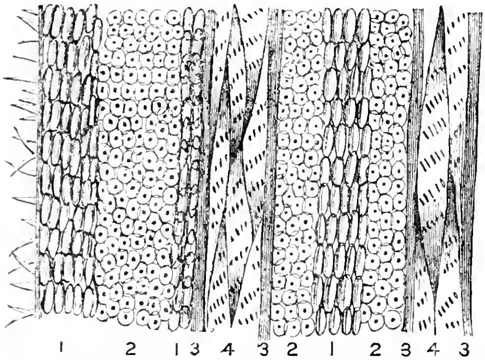


Fig. 187.—Longitudinal section of underground stem of Common Brake Fern *(Pteris aquilina)*.

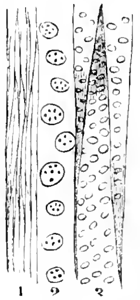


Fig. 188.—Part of fibro-vascular bundle of Pteris, more highly magnified.

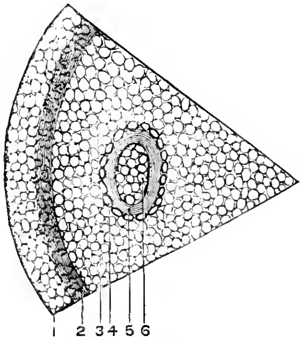


Fig. 189.—Transverse section of part of petiole of Fern.

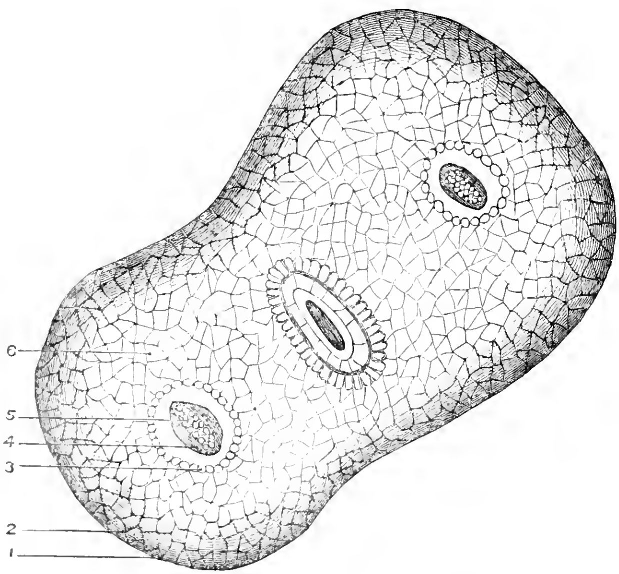


Fig. 190.—Transverse section of stem of Selaginella.

Before leaving this part of our subject, it would be well to take a section from the petiole. Fig. 189 is a transverse section of part of the petiole, or stalk of the frond of the common brake fern (*Pteris aquilina*, L.). No. 1 is the epidermis; 2, sclerenchyma; 3, fundamental, or ground tissue; 4 is the phloem sheath; 5 phloem (bast), and 6 merely denotes the fibro-vascular bundle; observe chiefly the phloem sheath, and ring of sclerenchyma in this section.

The Selaginella is easily procured from any nurseryman or gardener, and is a very characteristic plant. The stem is bilateral, with short internodes, and small roundish leaves generally in four rows. The root, as well as the stem, branch dichotomously in alternating planes. The axis of the stem, in all the Lycopods, is occupied by one or several vascular bundles, separated from each other by intermediate parenchymatous tissue. In the Selaginella the bundle is connected with the epidermis by a very loose spongy tissue, so that it appears to lie almost isolated in a cylinder filled with air, and connected with the walls only here and there by parenchymatous cells. The structure of the vascular bundle itself is always uniform; the xylem portion consists of wider vascular cells in its inner, of narrower vascular cells in the outer part. The axial vascular bundle sends out ramifications into the branches and leaves.

In fig. 190, transverse sections of stem of Selaginella, two fibro-vascular bundles are noticed, one near each end. No. 1 is the thick epidermis; 2, a ring of dark-looking cells of the sclerenchyma, encircling the stem beneath the epidermis, but quite distinct from the fundamental or ground tissue; 3, bundle sheath; 4, phloem; 5, xylem; these latter are readily recognised; 6 is soft parenchymatous tissue.

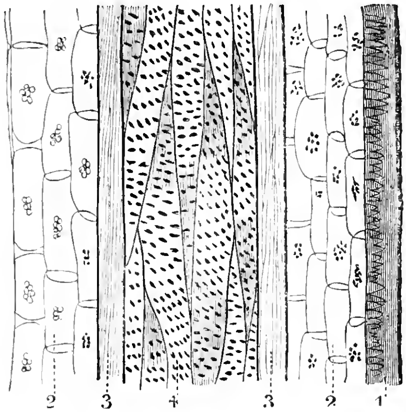


Fig. 191.—Longitudinal section of stem of Selaginella.

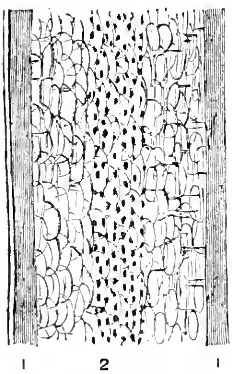


Fig. 192.—Longitudinal section of stem of Selaginella.

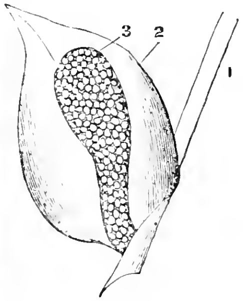


Fig. 193.—Ligule of Selaginella.

Now cut a longitudinal section across the stem without touching the bundles, as fig. 192. No. 1 is sclerenchyma, and 2 soft parenchymatous cells, those in the centre filled with starch. Now observe another longitudinal section intersecting one of the fibro-vascular bundles (fig. 191, longitudinal section of Selaginella stem). We note 1, sclerenchyma; 2 2, ground tissue containing starch; 3 3, phloem, or bast; 4, xylem of scalariform vessels; the ladder-like appearance easily points out the xylem layer.

Upon separating the leaves on the lower part of the stem, the peculiar ligule (fig. 193, ligule of Selaginella) will be detected. The part marked 3 is the ligule, which distinguishes the Selaginella from the Lycopods. No. 1 represents the stem, and 2 the leaf, at whose base the ligule is seen to take its rise. It is composed of parenchymatous tissue.

J. F. R.

THE QUAKERS OF TOKIO.*

WITH shivers and shakes and jelly-like quakes,
The earth it is moved in Japan;
At least they say so in old Tokio,
Where the trembles they've tried to trepan
—in Japan.

John Mylne set the snare with the utmost of care,
That he might discover the plan
Of the *micro* landshakes and bigger earthquakes
Intercepting the quivers that ran
—in Japan.

Though rigid as steel, earth's tremors we feel,
Not hitherto noticed by man;
For age brings her ague, with which she will plague you
In England as well as Japan
—in a span.

These shuddering breaks affect the still lakes,
And the waters that into them ran;
Such pulsating throes we must now *diagnose*
With instruments brought from Japan
—that's the plan.

Those who live by railways must try, if you *plase*,
That is, do the best that they can,
Give up their inaction to study the traction
And trembles that jolting old wagons began
—as they ran.

Science ne'er swerves from her ways, but I've nerves
That disturbed even are by a fan.
Why dwell 'midst alarms and horrible calms
As the natives now do in Japan?
—old man?

No, Mylne, I will seize my moments of ease
To prove it a truth, if I can;
By figures profound, this *is* solid ground,
Though trembles be part of the plan
—of Japan.

A. CONIFER.

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* See Professor John Mylne's letter to the "Times," Oct. 11, on 'Earth Movements.' Reprinted in "Geo. Mag." for Nov., with editorial remarks.

THE POISONOUS LIZARD OF MEXICO (*HELODERMA HORRIDUM*).

MR. W. TEGETMEIER recently gave the following account of this anomalous lizard in the "Field." The German naturalist Wiegmann described in the "Isis," in the year 1829, a new lizard, under the title of *Heloderma horridum*. This lizard differs from Lacertine animals in general in the circumstance of the teeth having a marked ophidian character.

The heloderme, according to M. F. Sumichrast, inhabits the hot zone of Mexico—that intervening between the high mountains and the Pacific in the districts bordering the Gulf of Tehuantepec. It is found only where the climate is dry and hot; and on the moister eastern slopes of the mountain chain that receive the damp winds from the Gulf of Mexico it is entirely unknown. Of its habits but little is known, as it appears to be, like many lizards, nocturnal, or semi-nocturnal, in its movements; and moreover it is viewed with extreme dread by the natives, who regard it as equally poisonous with the most venomous serpents. It is obviously, however, a terrestrial animal, as it has not a swimming tail flattened from side to side, nor the climbing feet that so characteristically mark arboreal lizards. Sumichrast further states that the animal has a strong nauseous smell, and that when irritated it secretes a large quantity of gluey saliva. In order to test its supposed poisonous property, he caused a young one to bite a pullet under the wing. In a few minutes the adjacent parts became violet in colour, convulsions ensued, from which the bird partially recovered, but it died at the expiration of twelve hours. A large cat was also caused to be bitten in the foot by the same heloderme; it was not killed, but the limb became swollen, and the cat continued mewing for several hours, as if in extreme pain. The dead specimens sent to Europe have been carefully examined as to the character of the teeth. Sections of these have been made, which demonstrate the existence of a canal in each, totally distinct from and anterior to the pulp cavity; but the soft parts have not been examined with sufficient care to determine the existence or non-existence of any poison gland in immediate connection with these perforated teeth.

Such may be regarded as a summary of all that was known respecting this animal until the 16th of July, when a living specimen, some nineteen inches in length, was presented by Sir John Lubbock to the Zoological Gardens. It arrived in a long tin box about four inches square by twenty inches long. The door at one end covered a small opening, through which Mr. Bartlett was unable to shake out the creature; so he seized it by the head and deposited it in a cage, little suspecting the risk he was incurring of a venomous bite.

For some days the heloderme refused every kind of food offered to it. A live frog placed in the cage was bitten, and, after a few seconds, liberated, but it died in convulsions almost immediately; a guinea pig, bitten in the hind leg, died convulsed in three minutes; and some young rats perished even more quickly. As the animal had not been fed since its despatch from Mexico, there seemed every probability of its dying of inanition, when it was tried with a hen's egg, broken in a shallow dish; this it lapped up with its large, strap-shaped, fleshy tongue, which, like that of most of its congeners, is bifurcate at the tip.

On my second visit to it on Thursday morning to verify the correctness of the very characteristic engraving which accompanied my article, Mr. Bartlett and his son very kindly proposed to feed it again. A couple of eggs were procured, one being a very small pullet's egg, weighing about an ounce. On inquiring of the keeper, we found that he had already given it a hen's egg in the morning; but, nevertheless, the pullet's egg was placed on the shingle at the bottom of the cage, which is in the reptile house. On our drawing back from the cage, the heloderme at once made for the egg, passed his long fleshy tongue over and around it, and then opened his mouth to seize it; the egg being rather large, it kept slipping away, until it was pushed by the animal to the front of the cage, where he succeeded in biting through the shell and licking out the contents, concluding by plunging the fore part of his head into the interior, so that no portion could escape.

From the readiness with which eggs are attacked, it appears obvious that they constitute a large portion if not the entire, of the animal's natural food. I propose trying it with those of pigeons, which will, in consequence of their smaller size, be eaten with less difficulty, and I shall try one or two at an advanced period of incubation. But should the animal be exclusively an egg eater, the question arises as to the possession of the poisonous properties that it undoubtedly possesses, and the useful purpose they subserve in the economy of the animal.

The general colour is a creamy buff, with dark brown markings disposed in a not unpleasing pattern. The front part of the head and muzzle is entirely dark, the upper eyelid being indicated by a light stripe. The entire body is covered with circular warts.

The animal is one of considerable interest to naturalists, as the existence of a poisonous lizard had been doubted by many observers.

OTTERS IN CO. DOWN.—Otters are still to be found on the river Lagan, at Maralin, in co. Down, fourteen miles from Belfast, where two fine specimens were shot this year. The Lagan at the place is only a small stream, but has been given an unnatural depth by some mill dams or weirs on it, and so it provides suitable retreats for the otters.

NOTES ON INDIAN BUTTERFLIES.

MELANITIS ISMENE (M. Bela). My recollection of the habitat of these insects is of a dark, thickly-shaded, gloomy Himalayan hill-slope, clad with oak (*Quercus incana*) and creel (*Pinus longifolia*).

On very hot days, they may be seen flying with a short, jerky flight, in the shade of the trees, just within the line of sunlight. On such days you are as glad of the shade as the Melanitis; and it is curious, as you tread the forest path, to see it rise suddenly at your feet and disappear as quickly within a yard. On the wing, it is of course plainly seen, except in very dark corners; but the moment it settles among the dry spikes of the pines, and the brown, scanty vegetation, which struggles for bare existence under these trees it is lost; and it requires much experience of its way and keen eyes to find it—no small object either—lying within a foot or two of the path.

The genus Melanites mimics on the under side of the wings many species of fungi: and this, with the sober colouring of the upper side, increases the difficulty of finding the insect amid the debris of the forest.

The under sides of this genus are in all the species very variable; scarcely two being exactly alike, as in other genera: and this may arise from the fact that they mimic the fungus most common at the time and place of their flight.

Elymnias undularis.—One of the most curious mimics known is the female of this species, which bears a remarkable likeness to *Danais chrysippus*, the larvæ of which feed on madar (*Calotropis gigantea*), which makes them and the butterflies distasteful to birds and other enemies, and, I believe, poisonous. In a cabinet, mites will not injure *D. chrysippus*, though they devour everything else in the drawer. The mimicry in this case is remarkable, because the structure of the two insects is very different, belonging, as they do, to widely separated species and genera: and undularis has much the appearance of a rough drawing of chrysippus, made on a black board simply to produce the general effect to an unscientific eye. Whilst the female of undularis is of the rich chocolate brown of chrysippus, and has its white markings, the male is nearly black, with a rich purple submarginal, interrupted band; there is absolutely no resemblance between husband and wife, and the mimicry would seem to be valuable in preserving the eggs of the future brood from the ravages of enemies.

Kallima Hugeli mimics a dry oak leaf on its under side. It is a gay, conspicuous butterfly, measuring four inches across, and no doubt owes its existence very often to its power of resembling a dead leaf when it settles.

Papilio govindra—or, as Moore has lately in describing my collection called the genus, Cadugoïdes—is a mimic, both in form and pattern, of *Caduga tytea*, Danais Sita of Kollar; but I do not understand, in this case, the value of the mimicry.

JOHN H. HOCKING.

[Mr. Hocking has kindly shown us a number of specimens of *Melanitis*. The dark spots on the outer wing-surfaces are differently grouped in almost every specimen, and resemble the fungus *melampsoræ* now to be seen on dead poplar leaves.—ED. *S.-G.*]

WATER SNAILS; A STUDY OF POND LIFE.

TWO points have struck me in perusing this interesting paper, to which, as no one else has done so, I would venture to draw attention.

Firstly, with regard to the formation of the shell of the snail, the author quotes the old belief that it "consists of the upper layers of the mantle which have been thrown off, after the cells have been filled by a deposit of carbonate of lime."

This, however, is now by no means universally accepted as a correct interpretation of the process. Professor Huxley, in his article "Tegumentary Organs," in Todd's "Cyclopædia of Anatomy and Physiology," vol. v. pp. 489-492, maintains that the shell is found as an excretion from the surface of the epidermis, and in this view he has the support of so high an authority (were such needed) as Dr. Carpenter, "The Microscope," 6th ed. p. 669. Moreover, an interesting paper on this subject by MM. Louge and E. Mer appeared in "Comptes Rendus," vol. xc. p. 882, of which an abstract is given in the Journ. Royal Micro. Soc. vol. iii. p. 417.

The authors of this paper are enabled to show that the different layers of the shell are produced by different regions of the mantle, and as they describe these parts and their functions very fully, this paper is well worth the attention of all conchologists.

In the second place, I am sorely perplexed by the concluding sentence of the anonymous author, in which, speaking of the development of the embryo snail, he says, "It may be interesting to note that what is known as the 'foot' of the snail by the embryonic development is really *an under-lip*," (the italics are his), nor do his figures make this statement one whit more intelligible to me; so I fear that I must have overlooked, somewhere or other, an important paper on the homology of the "foot" in Gasteropoda.

In the adult Lymneidæ certainly the head seems distinct enough from the foot, as may be seen from the figures given in the author's own paper (fig. 51, 52, p. 80), where the molluscs are represented as they appear when crawling on the surface of the water; but even when climbing the glass of the aquarium, a well-defined line across the under-surface just below the mouth marks the junction of the two closely-applied parts clearly enough. Moreover, if correct, this theory of a differentiated under-lip ought to be equally applicable to all the Gasteropoda, and it is difficult to see how it could be applied to cases, like, for instance, Paludina, in which the head having a well-defined snout is yet further isolated from the foot than in Lymneæ. Hence, in common, I should imagine with other readers of SCIENCE-GOSSIP, the writer would feel much obliged to the unknown author of this interesting paper on "Water Snails," if he would kindly explain at greater length this remarkable development in molluscoid anatomy and its application throughout the whole class Gasteropoda.

B. B. WOODWARD.

RARE PLANTS.—Mr. Newbitt would perhaps be interested to know that I have a specimen of *Trollius Europæus* from Goathland, near Whitby. It is not far from the celebrated locality for *Cornus suecica*, viz., the Hole of Horcum.—*J. A. Wheldon, 9 South Street, Scarborough.*

ON BRITISH FRESHWATER MITES.

By C. F. GEORGE

[*Continued from page* 250.]

No. III.

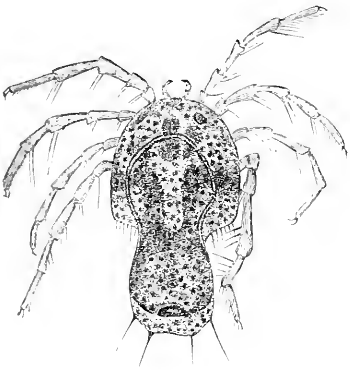

Fig. 194.—*Arrenurus globator* ♂ (upper side).

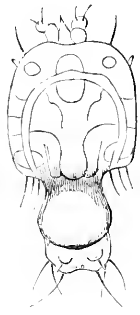

Fig. 195.—Another specimen.

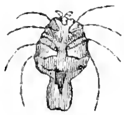

Fig. 196.—2 in.

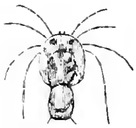

Fig. 197.

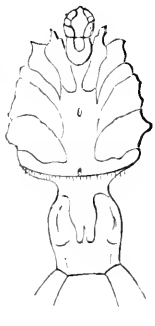

Fig. 198.—Under side (2/3).

Fig. 199.—Side view of tail of *A. globator*.

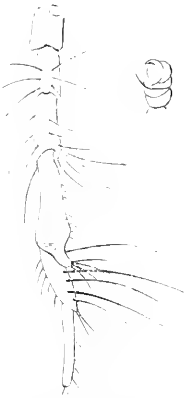

Fig. 200.—Under side of hind leg of *A. globator*.

Fig. 201.—Palpus, under side.

Fig. 202.—*Arrenurus globator* ♀ (with 2 in.).

ARRENURUS GLOBATOR (Müller). This is one of the smallest of the tailed mites; it is of a lightish green colour; the markings produced by the cœca are brown and white; it is easily known by the globular projection which it carries on the upper surface of the tail. On the last joint but two of the hind leg there is a peculiar spur-like projection, carrying a brush of swimming bristles; this projection is also found on the hind leg of several of the male Arrenuri. The female, as will be seen by the figure, is as unlike the male as could be well imagined; it has no tail, and is much larger than its partner.

Arrenurus buccinator (Müller). This mite is much larger than *A. globator*; the greater portion of the body part is of a beautiful blue, becoming so dark towards the tail part as to look black. A considerable portion of the tail is yellow, shading off to deep orange; round the eyes, and within the impressed line, there is a space of deep orange, approaching to red, but the amount of colour varies in different specimens. The spur on the last joint but two of the hind leg is rather large.

Arrenurus maculator (Müller). In this mite the tail part is only slightly smaller than the body. It is a mites. My figures are intended to assist in the identification of the creatures, and not to stand as their portraits. Moreover, verbal description is less necessary where recognisable figures are given, and, as in this instance, I may frequently give a sketch of the body of the mite, without drawing the legs. I shall thereby save a good deal of labour in the drawing, and space in the valuable columns of SCIENCE-GOSSIP.

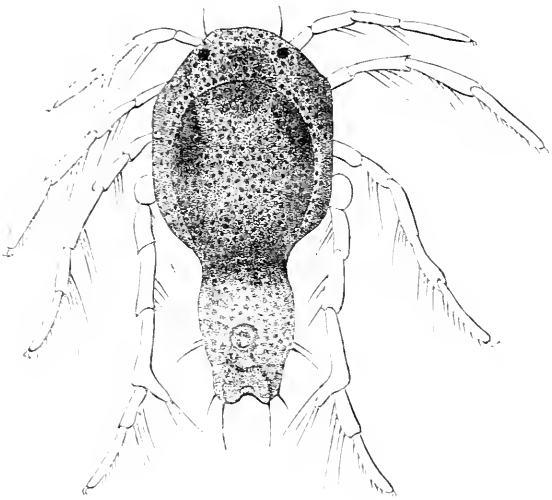

Fig. 203.—*Arrenurus buccinator.*

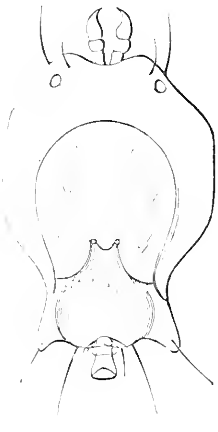

Fig. 204.—*Arrenurus maculator*, upper side (⅗).

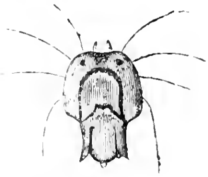

Fig. 205.—*A. maculator*, upper side (2 in.).

Fig. 206.—Hind leg.

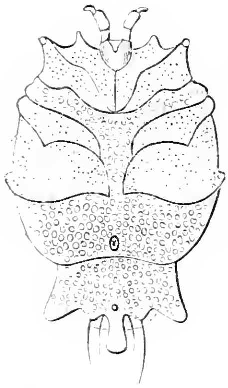

Fig. 207.—*Arrenurus maculator*, under side.

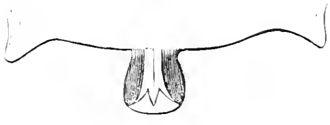

Fig. 208.—Central part of tail.

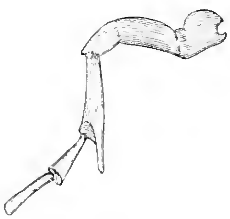

Fig. 209.—Hind leg of *A. viridis*, showing spur.

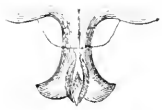

Fig. 210.—Central part of tail of *A. viridis.*

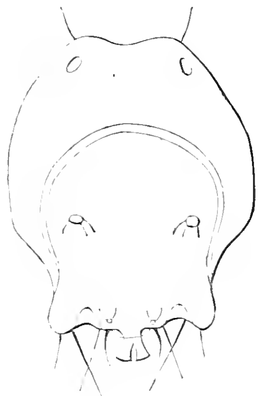

Fig. 211.—*Arrenurus viridis.*

very beautiful mite, and will be easily recognised from the drawing. It has the spur on the last joint but two of the hind leg; and the central projection from the tail is peculiar. My sketch does not show the beautifully maculated surface of the mite, and my figures must be taken as mere outlines; indeed, it requires a very superior artist, and the assistance of colour, to give even an idea of the great beauty of all the Arrenuri, as well as of most of the other water

Arrenurus viridis (Dugès). This mite much resembles *maculator* in appearance. It is, however, easily distinguished by the peculiar formation of the central projection from the tail. In *maculator* it is somewhat like a chisel with a convex edge, whilst in *viridis* it more resembles a beautiful device for the head of an iron palisade, for which it might well serve as a model. The spur on the last joint but two of the hind leg is also well developed.

NOTES ON THE SCHIZOMYCETES.

[*Continued from page* 226.]

No. IV.—VII.

LEPTOTHRIX, Kützing. Threads very long and slender, *unbranched*, apparently inarticulate, colourless, *without motion*, *not granular*, free or felted together.

The fungi assigned to the genus Leptothrix are of very questionable value as species; I therefore include the following with all reserve. Leptothrix-like formations are very common in Bacillus.

Since this genus will probably remain only a short time among the fungi, I do not think it desirable to give it a new name now. The greater part of the species of Leptothrix are typical phycochromaceous algæ!

Fig. 212.—Threads of Leptothrix, × 800 (after Rabenhorst).

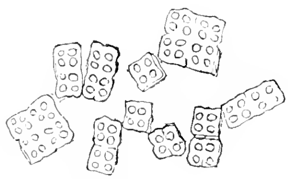

Fig. 213.—*Sarcina hyalina*, × 420 (after Kützing).

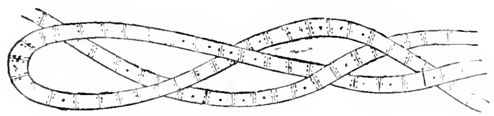

Fig. 214.—*Beggiatoa pellucida*, × 400 (after Cohn).

39. *L. buccalis*, Robin.

Threads very long and slender, ·7–1 μ (seldom somewhat more) thick, inarticulate, colourless, densely felted in white masses.

Mixed with Micrococci (usually also with Vibrio) in the white slime of the teeth, on the epithelium of the mouth, and in hollow teeth; probably the cause of dental caries.

The seat of this fungus is especially in the canals of the dentine, yet it also attacks the substance of the enamel, which it destroys by degrees. In those canals the fungus produces decided enlargements, and afterwards their walls become pierced by crevices and fissures, and break to pieces.

40. *L. parasitica*, Kütz.

Threads very slender, for the most part curled and crisped, indistinctly jointed, loosely felted, almost colourless, about 1 μ thick, 100–140 μ long.

Parasitic on Scytonemaceæ and other allied algæ.

Perhaps also *Leptothrix pusilla*, Rabenhorst, and *L. lanugo*, Kütz., should be placed among the fungi.

VIII. BEGGIATOA, Trevisan. Threads very long, but thicker than in Leptothrix, for the most part indistinctly jointed, stiff, but *actively oscillating*, embedded in gelatine, colourless; protoplasm *provided with* numerous, strongly refringent *granules*, which consist of sulphur.

The genus Beggiatoa is easily to be recognised by the strongly motile threads, which form usually chalk-white or slimy masses, and in which the articulations cannot, as a rule, be perceived without further treatment. In order to see them, allow the threads to dry on the slide, and then add sulphide of carbon, which by degrees dissolves the sulphur granules which in the living fungus obscure the joints. The Beggiatoæ live for the most part in sulphur hot-springs, where they decompose the compounds of sulphur dissolved in the water, and eliminate free sulphuretted hydrogen. So that such water, enclosed in a flask with Beggiatoa, evolves an intense smell of sulphuretted hydrogen.

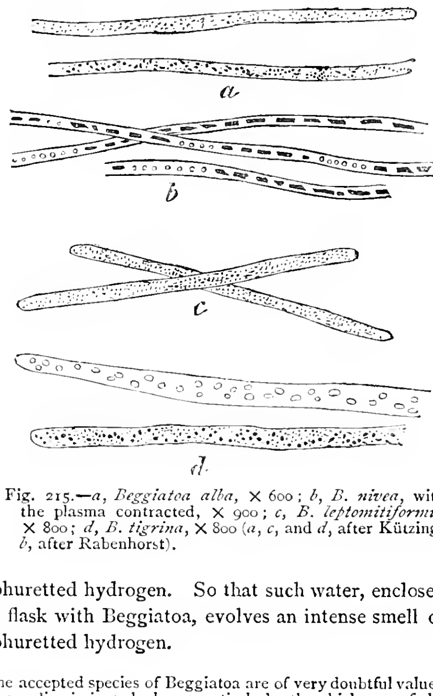

Fig. 215.—*a*, *Beggiatoa alba*, × 600; *b*, *B. nivea*, with the plasma contracted, × 900; *c*, *B. leptomitiformis*, × 800; *d*, *B. tigrina*, × 800 (*a*, *c*, and *d*, after Kützing; *b*, after Rabenhorst).

The accepted species of Beggiatoa are of very doubtful value; they are discriminated almost entirely by the thickness of the threads.

41. *B. alba* (Vauch.), Trev.
Beggiatoa punctata, Trev.
Oscillaria alba, Vauch.
Hygrocrocis Vandelli, Menegh.

Threads without distinct articulations, forming dirty or chalk-white gelatinous masses, 3–3½ μ thick.

In sulphur springs and marshes.

Var. *marina*, Cohn. Threads densely filled with blackish granules, only 2 μ thick.

Forming a delicate snow-white gelatinous membrane on decaying animals and algæ in an aquarium with sea-water. (Fig. 215, *a*.)

42. *B. nivea*, Rabenh.

Leptonema niveum, Rabenh.

Threads very slender, indistinctly jointed, $1\text{–}1\frac{1}{2}\ \mu$ thick (according to Rabenhorst), forming undulated woolly tufts of a chalk-white colour.

In sulphur springs. (Fig. 215, *b*.)

In Wartmann and Schenk's "Schweiz. Kryptog.," No. 639, this species is published under the name of *Symphyothrix nivea*, Brügger. Both the names given above are cited as synonyms, but only *pro parte*. From the label attached I extract the following observations:—"Threads inarticulate and motionless, only $\frac{1}{4000}$ to $\frac{1}{1680}'''$ thick ($= \cdot 5 - 1 \cdot 3\ \mu$), parallel and much entangled, in penicillate tufts, strings, and sheaves of very unequal size, which are surrounded by a common, homogeneous, colourless gelatine."

tions as long or half as long as broad. Threads $5\text{–}6\frac{1}{2}\ \mu$ thick, forming thin, arachnoid, chalk-white gelatinous membranes.

In sulphur springs and marshes.

45. *B. pellucida*, Cohn.

Threads about $5\ \mu$ thick, motile, distinctly jointed, with rounded ends; articulations almost as long as broad, translucent, containing but few granules.

In an aquarium with sea-water. (Fig. 214.)

46. *B. mirabilis*, Cohn.

Threads very thick, motile, bent and curled in

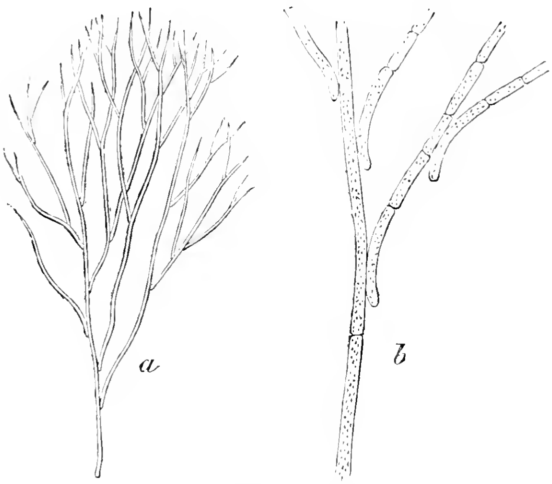

Fig. 216.—*a*, *Cladothrix dichotoma*, × 100; *b*, a part of the same, showing the false dichotomy, × 600 (after Cohn).

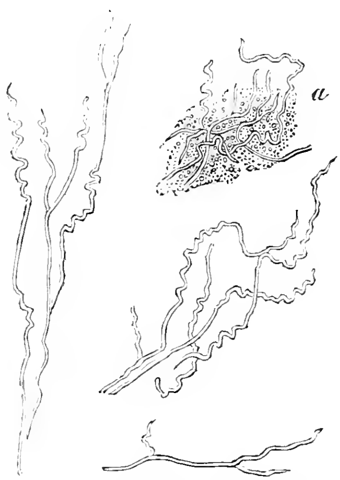

Fig. 217.—*Cladothrix Försteri*, × 600; *a*, the threads embedded amongst Micrococci (after Cohn).

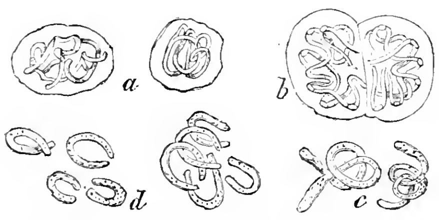

Fig. 218.—*Myconostoc gregarium*. *a*, gelatinous spheroids, containing the threads; *b*, a spheroid in the act of division; *c*, the threads separated; *d*, the threads breaking up into ring-shaped pieces.

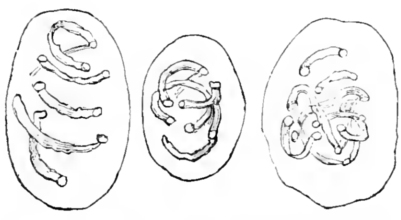

Fig. 219.—*Myconostoc gregarium*, × 1500 (after Lankester, who considers it a zoogloea form of *Spirillum undula*.

43. *B. leptomitiformis* (Menegh.), Trev.

Oscillaria leptomitiformis, Menegh.

Threads very slender, indistinctly jointed, about $1 \cdot 8\text{–}2 \cdot 5\ \mu$ thick, forming a thin chalk-white slimy layer.

In sulphur springs. (Fig. 215, *c*.)

44. *B. arachnoidea* (Ag.), Rabenh.

Oscillaria arachnoidea, Ag.

O. versatilis, Kütz.

Threads pretty thick, distinctly jointed, strongly motile, with rounded slightly curved ends. Articula-

various ways, with rounded ends, distinctly jointed, as much as $16\ \mu$ thick; articulations about half as long as broad, filled with numerous, pretty large granules. Threads twisted round and entangled with one another, forming a snow-white web of gelatinous threads.

With the preceding.

Doubtful Species.

47. *B. tigrina*, Rabenh.

Oscillaria tigrina, Römer.

Threads pretty thick, oscillating, distinctly jointed, with blunt and slightly bent, sometimes abruptly attenuated, and crooked ends, translucent, $3\frac{1}{2}$–$4\frac{1}{2}$ μ thick; forming thin white layers.

In marshes and on wood under water. (Fig. 215, *d.*)

48. *B. minima*, Warm.

Very minute, actively motile and flexile. The longest specimens about 40 μ long, 1·8–2 μ thick; articulations discernible in the form of delicate transverse bars. Each joint about half as long as broad. Without granules.

In sea-water.

IX. CLADOTHRIX, Cohn. Threads like those of Leptothrix, very slender, colourless, not articulated, straight or slightly undulated, or even in places twisted in irregular spirals, *with false branching.*

I can discover no sufficient distinction between Cladothrix and Streptothrix. Both are very doubtful genera.

49. *C. dichotoma*, Cohn.

Threads repeatedly and regularly dichotomously ranched, straight or slightly bent, about ·3 μ thick, rming small tufts of $\frac{1}{2}$ or more mm. in diameter.

In putrid water, partly floating on the surface, partly attached to algæ. (Fig. 216.)

The branching is here, just as with *Cladothrix Försteri*, only apparent. A thread splits itself down the middle into two halves, which lengthen independently, and thus grow side by side, whereby the piece which was separated is pressed on one side, and so appears as a branch.

50. *C. Försteri*, Cohn.

Streptothrix Försteri, Cohn.

Threads straight or bent, in places twisted in irregular spirals, sparingly and irregularly branched, separating into pieces of various lengths.

In the lachrymal canals of the human eye, forming tallowy or crumbling masses, which are yellowish-white or blackish, $1\frac{1}{2}$–3‴ long, and about 1‴ (*i.e.*, about 2 mm.) thick. (Fig. 217.)

X. MYCONOSTOC, Cohn. Threads very slender, colourless, inarticulate, but on desiccation breaking up into short cylindrical fragments, variously bent and intertwined, *surrounded by gelatine, which forms spheroidal masses* of 10–17 μ (or more) in diameter. Multiplication by constriction and bipartition of these gelatinous masses.

51. *M. gregarium*, Cohn.

Gelatinous masses floating on the surface of putrid water, singly or heaped into little slimy drops; exterior boundary sharply defined.*

On water in which algæ were decaying. (Figs. 218, 219.)

W. B. GROVE, B.A.

(*To be continued.*)

* This species was recorded by Professor Lankester as a phase of *Spirillum undula* (Q. J. M. S., xiii. 424), but as no genetic connection between the two has yet been traced, Cohn thinks it better, at present, to keep it distinct. It derives its name from its analogy with Nostoc among the algæ.—TR.

MICROSCOPY.

METEORITES.—The March number of the Journal of the Quekett Microscopical Club has a paper on "Fluid contents in Meteorites," by Mr. H. Hensoldt. Can any reader tell me where to find any further information bearing upon the subject? I have obtained from Messrs. Watson & Son, High Holborn, several slides of a meteorite, prepared by Mr. Hensoldt, each showing moving bubbles very distinctly. The discovery, if confirmed, upsets so many theories on Meteorites, that there will, no doubt, be considerable discussion on the subject.—*H. M., Sidcup, Kent.*

MICROSCOPICAL NOTES.—The August number of the American Monthly Microscopical Journal notifies that the subject of uniformity in size and nomenclature of eye-pieces was about to be discussed by one of the American societies. Mr. Davis, in his excellent work "Practical Microscopy," deplores the want of an universal gauge for eye-pieces and sub-stage fittings. While the matter is more or less before the public, there is one phase of it to which attention may well be redirected. Uniformity in size of oculars and sub-stage fittings would be an immense boon to microscopists residing at places far removed from manufacturing opticians, and who, if uniformity prevailed, could from time to time add to their stock of microscopical appliances by merely ordering the specific articles they required. There are places not a hundred miles distant from where I write, at which one cannot get satisfactory adapters fitted, nor additional sub-stage apparatus, nor a new ocular, nor even a well-fitting camera lucida for a given eye-piece, without sending some portion of a microscope, in constant use, all the way from India to a London optician. This state of things does not encourage the use of the instrument. It involves great delay and a double risk of transit, and also expense of carriage which in no way benefits the opticians themselves. I am not a stranger to these drawbacks, and know that others are or have been in like plight. The universal screw was a step in the right direction, but there it only applies to objectives. What is still required is uniformity of gauge for oculars and sub-stage fittings. Writing to you a few months back I drew attention to some of the difficulties which, in my humble experience, beset mounting in our hot and humid climate. Since then I have got out a copy of Davis's Practical Microscopy, and have tried balsam and benzol, and dammar and benzol, following the recipes and processes given by him. The benzol solutions really set in about three to five weeks, and, without vacant spaces showing themselves round the edge of the thin glass cover. I may here mention that for baking the balsam for the benzol solution, and indeed for other processes where heat maintained for some time is necessary, I use the oven compartment in one of Rippingilles' kerosene oil stoves, and find it after a little practice a very useful adjunct to my appliances. I used to experience much disappointment in my dry mounts. I succeed now, by employing the shellac varnished paper-rings recommended by Professor H. L. Smith, in an article published in "Science," and of which an abstract is given at p. 183 of the "American M. M. Journal" for 1880. I manufacture my rings with two gun-wad punches of different bores. Some care is requisite in heating the slide.—*W. J. S.*

Mr. F. Bolton's "Portfolio of Drawings."—No. 8 of this valuable collection is just out, and will be at once secured by all microscopic workers who treasure Mr. Bolton's practical remarks. Clearness and terseness are happily combined in his descriptions, whilst the illustrations, if not specimens of high art, are vigorous and truthful, and always successful in bringing out the "points" of an object. Among other objects here described are *Prasiola crispa*, *Rivularia*, *Vaucheria*, *Loxophyllum*, *Condylostoma*, *Vorticellidæ*, *Floscularia trifolium*, *Planaria lactea*, *Piscicola*, &c.

"The Microscopical Compendium."—We have received a specimen of the above from Mr. E. Marlow, 111, Constitution Hill, Birmingham, and have much pleasure in recommendiug it to microscopists generally. It is in reality a very pretty little cabinet, arranged so that the top holds the turn-table, whilst the interior contains drawers for slides, brushes, bottles of chemicals and varnishes, cements, &c., all of which are necessary to mounters.

Continuous Observation of Micro-Fungi.—Will any readers of Science-Gossip kindly give me some information about observing the germination of fungus spores under the microscope? I have for some time been attempting to experiment with various fungi, and cannot get the spores to germinate well—under a cover-glass, not at all. When uncovered some spores will send out filaments to a certain extent, but here the pabulum gets dry and the process stops short. I have at present chiefly experimented with varieties of *Aspergillus* and with *Spirendonema musca*.—*G. M. Wasse.*

Studies in Microscopical Science.—Mr. A. C. Cole's weekly studies keep up their high character. We would particularly notice one on "Dolerite" just sent out. It is an excellent model of petrological study, and the slide accompanying the weekly number is a highly-finished production, fit either for ordinary or polariscopic examination. Most of these studies are full of original research, at the same time the author is careful to include all that has been said on the subject by others.

Brazilian Birds.—I should feel obliged if any of your correspondents could tell me if there are any books published on the Birds of Brazil, and if so, what are their titles.—*G. A. K.*, *Pendleton.*

ZOOLOGY.

"Report on the Migration of Birds."—This paper (published by West, Newman, & Co.) contains a summary of investigations of a committee appointed by the British Association in 1881. An abstract of it was read at the Southampton meeting by Mr. Philip M. C. Kermode. The report deals with bird information from the east and west coasts of Scotland, the east and west coasts of England, and the Irish coast.

"The Naturalists' Monthly."—Under this title we have to welcome a new *confrère*. It is neatly got up, well edited (by Mr. R. Christie), and contains a variety of natural history notes and articles, some of the latter by known writers. The price is only one penny. We cordially wish it success.

Chelifer Degeerii (C. Koch), a species new to Britain.—Whilst collecting shells and mineralogical specimens on the promontory at North Berwick, Scotland, on September 13th, I procured three specimens of the above-named Pseudoscorpion. Their proximity to the sea was such that at high tide the spray was constantly thrown upon the cracked igneous rock which sheltered them, and which, in stormy weather and during neap and spring tides, is submerged; though I doubt not the Chelifers and other minute terrestrial forms common to the innumerable cracks and crevices of these and other rocks about the "Bass" will be dry, owing to the difficulty of displacement of air by water, from such narrow fissures as they lodge in. Associated with them in the loose earth that sparingly filled the crevices were Poduræ and Onisci. I kept the Chelifers alive for above a week. Whilst seeking food they ran backwards and forwards with equal celerity; carrying the maxillary palpi or chelæ (hence the name) elevated about one-third above the head; the dactylopodite and propodite held apart. They seized almost everything they came near, especially each other's chelæ. Perhaps the most interesting feature one noticed was the quick and indiscriminate use of both nipping organs in conveying food to the mouth. The position, elevation, sensitiveness, &c., betokened in the chelæ a character homologous to antennæ. On submitting the specimens to the Rev. O. P. Cambridge, who is collecting material for a monograph on British Chelifers, and in which will be given figures and descriptions of this new addition to our fauna, I learned that they were *Chelifer Degeerii*, C. Koch. —*Henry Crowther*, *Beeston Hill*, *Leeds.*

Pachynobia hyperborea.—In a late number of Science-Gossip, Dr. J. A. Osborne has asked me to fix a local habitation and a name for a moth thus styled, and at the same time he inquires of me regarding the nature of its food-plant. In reply I may state in passing that the editorial of the "Entomologist" (see vols. for Dec. 1881 and Feb. 1877) are in the habit of employing the name synonymously for *Pachynobia alpina*, the British history of which species will be found on referring to the ninth volume of the "Entomologist" (p. 24). I may also add that the sole object I had in view when I figured this moth was to call the attention of Scottish collectors to a Rannoch rarity which, as regards pecuniary value a little back, bade fair to dispute the market with the much prized Cairngorm pebbles. The breeding of the moth in Scotland is alluded to in the "Entomologist" for March 1879. I have not, to my knowledge, met with the larva.—*A. H. Swinton.*

The Senses of Bees and Wasps.—At a recent meeting of the Linnean Society, Sir John Lubbock read an account of his further observations on the habits of insects made during the past year. The two queen ants which have lived with him since 1874, and which are now, therefore, no less than eight years old, are still alive, and laid eggs last summer as usual. His oldest workers are seven years old. Dr. Müller, in a recent review, had courteously criticised his experiments on the colour sense of bees, but Sir John Lubbock pointed out that he had anticipated the objections suggested by Dr. Müller, and had guarded against the supposed source of error. The difference was, moreover, not one of principle, nor did Dr. Müller question the main conclusions arrived at, or doubt the preference of bees for blue, which, indeed, was strongly indicated by his own observations on flowers. Sir John also recorded some further experiments with reference to the power of hearing. Some bees were trained to come to honey which was placed on a musical box on the lawn close to a window. The musical box was kept going for several hours a day for a fortnight. It was then brought into the house and placed out of sight, but at the open window, and only about seven yards from where it had been before. The bees, however, did not find the honey, though when it was once shown them they came readily enough. Other experiments with a microphone were without results. Every one, Sir John Lubbock said, knew that bees when swarming were popularly, and had been ever since the time of Aristotle, supposed to be influenced by the clanging of kettles, &c. Experienced apiarists were now disposed to doubt whether the noise has really any effect, but Sir John Lubbock suggested that even if it had, with reference to which he expressed no opinion, it was possible that what the bees heard were not the loud low sounds, but the higher overtones at the verge of, or beyond, our range of hearing. As regards the industry of wasps, he timed a bee and a wasp, for each of which he provided a store of honey, and found that the wasp began earlier in the morning (at 4 a.m.), worked on later in the evening, and came oftener during the day. He did not, however, quote this as proving greater industry on the part of the wasp, as it might be that it was less sensitive to cold. Moreover, though the bee's proboscis was admirably adapted to extract honey from tubular flowers, when the honey was exposed, as in this case, the wasp appeared able to swallow it more rapidly. This particular wasp began work at four in the morning, and went on without any rest or intermission till a quarter to eight in the evening, during which time she paid Sir John Lubbock 116 visits.

Land Shells.—Mr. J. W. Cundall records Dudley Castle as a locality for *Cochlicopa tridens*, var. *crystallina* in your November number, under the impression that it has not been previously observed there. At page 7, vol. i. of the "Journal of Conchology," he will find that I noted it as inhabiting that locality in 1873. I am glad it is still there. On the same page (258) I note some remarks by my friend Mr. Charles Ashford (in reply to Mr. A. Loydell's question, September number, p. 214), touching the propriety of admitting certain shells into the British list. May I be allowed to make the following addenda thereto? I understand the term indigenous to mean "native to," i.e., not having been introduced artificially; and, in the absence of any information to the contrary, we have to consider *H. villosa*, *H. personata*, *C. parvula*, and *C. solida*, as coming under that head, albeit there are at present very slight grounds for supposing them so. Two specimens of *H. villosa*, I believe, have been taken near Cardiff, one dead shell of *H. personata* at Newcastle in Ireland, one specimen of *C. solida* near Bristol, and several shells of *C. parvula* at Kniver, Worcestershire. Reeve tells us the theory of migration points in a north-westerly direction; if therefore these species be really indigenous (their recorded habitats being continental), we should expect them to be found in south-east England. I have always had a strong suspicion that the *H. aperta* found by Professor E. Forbes in Guernsey was an unfinished shell of *Helix aspersa*, var. *tenuis*. I have taken this variety in the Channel Isles of the exact colour of aperta, and the resemblance struck me at the time. I had come to this conclusion before being aware of Dr. Gwyn-Jeffreys' pertinent remarks, p. 158, vol. i., "British Conchologist."—*G. Sherriff Tye.*

"The Butterflies of Europe," By H. C. Lang, M.D., F.L.S. Part X. of this splendidly illustrated work is to hand, dealing with the genera *Lycæna*, *Nemeobius*, *Libythea*, *Charaxes*, *Apatura*, *Limenitis*, &c.

Rooks and Starlings.—Now that autumn has commenced, I see as usual flocks of starlings and crows searching for grubs, &c., on almost every piece of meadow-ground. Sometimes their numbers are so great that the fields are *black* with them. Why is it that these two species, both of totally different families, always join bands about this season of the year?—*W. P. Ellis, Enfield Chase.*

BOTANY.

TRIFOLIUM STELLATUM.—Some years ago I found the *Trifolium stellatum* in considerable quantity near Shoreham, Sussex. This year I sought for it most diligently, but in vain. Is it about to share in the fate of so many of our rare plants, i.e. extermination? Has it been gathered at Shoreham or elsewhere within the last two or three years?—*H. E. Wilkinson.*

HOW TO MEND BROKEN STEMS.—I send you enclosed a specimen of fracture mending which I believe is not at all common. In the month of June last my servant knocked over a favourite fuchsia, breaking off almost completely a bit about two and a half inches long from the terminal branch. This fracture I "set" within five minutes with a splint of mixed white of egg and whiting, fixed the plant to its support by transfixing a leaf with a needle inserted in the support, and you see the result so far is perfect union, with no deformity save a little rough ring round the stem. The plant flowered freely above the union, and grew fully a foot in height afterwards.—*A. Drummond Macdonald, M.B.*, 3 *Peel St., Dingle, Liverpool.*

[The experiment is most interesting, and the result in every way satisfactory.—ED. S.-G.].

NEW BRITISH PHRAGMIDIA.—During the October ramble of the Yorkshire Naturalists' Union at Thirsk, I noticed, in an old lane near Pilmoor Junction, what I took to be *Phragmidium bulbosum*, exceedingly common on bramble leaves, and, whilst collecting it, I could not fail to notice a decided difference in the size of the sori, on different plants. The sori of the commonest form was comparatively large, whilst in others it was small and not so scattered. Upon examination it was quite evident they were not the same species. The spores of the smaller form had more septa and a longer apiculus, than those taken from the larger sori. Specimens of each were sent to Mr. C. B. Plowright, of King's Lynn, who stated they were distinct species, hitherto in this country confounded with *Phragmidium bulbosum*. Those with fewest septa are *P. violaceum*, Schl., the others *P. rubi*, Pers. I have a limited number of specimens, which I shall be glad to forward to any one interested applying for them.—*H. T. Soppitt, Saltaire, Yorks.*

FUNGUS FORAY IN EPPING FOREST.—The members of the Hackney Natural History Society made a fungus foray in Epping Forest on October 21. The meeting place was Chingford, which was reached at two o'clock, p.m., and, notwithstanding the heavy downpour of rain, the attendance was good, over twenty gentlemen being present, among them being the President, Dr. M. C. Cooke, A.L.S., Worthington Smith, F.L.S., Mr. James English, and others. The route taken was through Hawk Wood, Cuckoo Pits, Beech Glade, etc. Through these districts, armed with creels, knapsacks, etc., the company pursued the objects of their research, amid the continuous and heavy rain, pausing to admire the beautiful scenery of a forest clothed in its autumnal foliage, when tree, shrub, and bracken seem to vie with each other. The specimens found were numerous, many being rare, nearly one hundred different species being named by the conductors; among them may be mentioned *Agaricus adiposus*, *A. flavidus*, *A. spumosus*, *A. spectabilis*, *A. Worthingtonii*, named by Fries after one of our conductors, and only found in Epping Forest; *A. mucidus*, *A. ostreatus*, a beautiful specimen of *A. dryadeus*, *Clavaria inæqualis*, *Xylaria hypoxylon*, *Cantharellus aurantiacus*, *Fistulina hepatica*, *Paxillus involutus*, *A. mitis*, *A. variabilis*, *Polyporus cuticularis*, *Boletus subtomentosus*, and *A. lacrymabundus*. The company, now numbering nearly thirty, assembled at Fairmead Lodge, where a good repast had been provided; after which the President, in a short address, after mentioning some of the more rare specimens found, expressed sorrow that so much valuable food, as very many of these fungi are, should through ignorance be lost, at the same time cautioning his hearers against eating without knowledge. A vote of thanks was proposed and unanimously given to the conductors of the foray.

GEOLOGY.

FOSSIL TREES AT HANLEY.—In your May number you were kind enough to insert a few remarks about the above subject, and I should be pleased if you will kindly insert the following notes and measurements of twenty others which we have come across since I wrote to you in May.

No.	Height.	Diameter at Bottom.	Diameter at Top.
	inches.	inches.	inches.
17	60	30	16
18	Was only an impression. See Notes.		
19	96	30	18
20	108	27	20
21	96	30	24
22	102	29	19
23	Not measured, owing to fall of marl.		
24	84	32	21
25	91	28	20
26	54	30	20
27	144	45	24
28	117	36	18
29	136	27	15
30	102	Not measured	26
31	132	42	24
32	78	21	Not measured.
33	115	28	18
34	Not measured, owing to fall of marl.		
35	126	30	12
36	108	Not measured.	

No. 17. Tapered more than any yet found, and at the bottom it thickened out as if forming for the roots. Although no roots could be found, on cutting the tree down the centre, the carbon which

is the supposed bark, was distinctly traced for about 6 feet underneath the surface, and this evidently marked out the position of the root in that plane. No. 18. Was only an impression, the tree itself having been broken up before being perceived, but the impression was very plain and distinct indeed, and this is remarkable as being the only one, or traces of one, which has been found otherwise than in an upright position. No. 19. Had a very singular appearance (as the trunk for about 4 feet appeared as if it had been subjected to great pressure before being filled in and collapsed) and was of a very irregular shape, although the top was perfectly round and appeared as if it had been forced from the bottom part, which it overhung at least 12 inches. No. 20. In this tree were found several small ones (or branches) which were filled up similarly to the large trees, but the bark was perfectly petrified, and with the solid filling-in formed cylinders. In all other cases (except No. 25) I have not been able to find any markings of wood, but the bark from the small branches (?) obtained from this specimen is very beautifully marked, and shows the woody structure very beautifully. The general appearance of the section of this tree was very peculiar, as it was filled in (in the spaces not occupied by the branches) with sandstone and pieces of charcoal. The charcoal could be pulverised between the fingers just as easily as if freshly burned; in fact, the whole section had very much the appearance of a section of plum-pudding. No. 24. About 6 feet from the bottom, had a bulging out as if there had been a branch, but no traces of the branch could be found. No. 25. The whole trunk had a step-like appearance, and branches (?) were found on it, which showed the markings of wood as plainly as those found in No. 20. No. 27. Had a projection as if a branch had joined at that place, but I could find no traces of the branch itself. No. 32. Had the appearance of having been subjected to pressure, which had caused the outer parts of the trunk to give way, for in one place it was not more than 9″ diameter, and was oval in form instead of being round. Nos. 17 : 18 : 28 : 29 : 30 : 32 : 33 : and 36 were all marl inside. Nos. 19 : 20 : 21 : 24 : 31 : 34 and 35 were partially petrified. Nos. 22 : 23 : 25 : 26 and 27 were completely petrified. The bark of the trees, which is represented by coal, was about ¼″ thick, and in almost every case was marked in the same manner, with longitudinal parallel markings, and in no case was I able to detect any distinct signs or scars, where branches had been; although in some cases there appeared to be places where they might have been.—*Wm. Hampton, F.C.S.*

The Geology of Cornwall.—At a recent meeting of the Geological Society, Prof. Bonney described the metamorphic series, chiefly characterised by hornblendic schist, which occupies the southern portion of the Lizard, and an extensive tract to the north of the serpentine region, besides some more limited areas. He found that this series was separable into a lower or micaceous group—schists with various green minerals (often a variety of hornblende), or with brownish mica; a middle or hornblendic group, characterised by black hornblende; and an upper or granulitic group, characterised by bands of quartz-felspar rock, often resembling in appearance a vein-granite. These are all highly metamorphosed; yet the second and third occasionally retain to a remarkable extent indications of the minuter bedding structures, such as alternating lamination and current bedding of various kinds. They form, in the author's opinion, one continuous series, of which the uppermost is the thinnest. The general strike of the series, though there are many variations, is either N.W. or W.N.W. The junctions of the Palæozoic with the metamorphic series at Polurrian and at Porthalla were described. These are undoubtedly faulted; and the two rocks differ greatly, the former being a slate like any ordinary Palæozoic rock, the other a highly metamorphosed schist. Moreover, fragments of the hornblende schist and a kind of gneiss occur in a conglomerate in the former, S. of Nare Point. The author considers the metamorphic series (the microscopic structure of which was fully described) undoubtedly Archæan, and probably rather early in that division. The rocks of the micaceous group have considerable resemblance to the greenish and lead-coloured schists of Holyhead Island and the adjoining mainland of Anglesey, and of the Menai Strait. Two outlying areas of serpentine, omitted in his former paper, were described—one at Polkerris, the other at Porthalla. The latter shows excellent junctions, and is clearly intrusive in the schist. The author stated that he had re-examined a large part of the district described in his former paper, and had obtained additional evidence of the intrusion of the serpentine into the sedimentary rock with which it is associated. This evidence is of so strong a nature that he could not conceive the possibility of any one who would carefully examine the district for himself entertaining a doubt upon the matter.

Stomata in Fossil Plants.—Can any of your correspondents tell me where I can find any account of stomata having been observed in sections of fossil plants of any Palæozoic age? My friend, Mr. West of Bradford, has a coal section showing stomata very prettily, but it is the only one I have seen.—*H. M., Sidcup, Kent.*

Glacial drift in Birmingham.—An interesting paper on a section of Glacial drift recently exposed in Icknield Street, Birmingham, recently appeared in the "Proceedings of the Birmingham Philosophical Society," by Dr. H. W. Crosskey, F.G.S. The illustrations (which are very graphic) show the unbedded boulders very strikingly.

NOTES AND QUERIES.

SEASONABLE NOTES.—Observations made by Rev. S. Arthur Brenan during his incumbency of Altedesert, Co. Tyrone, in his parish and neighbourhood:—

——	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.
Frog-spawn	7.3	22.2	23.2	1.2	6.3	22.2	4.3	22.2	9.3	20.2
Swallows seen	28.4	21.4	16.4	20.4	16.4	13.4	22.4	20.4	14.4	12.4
Chiffchaff	16.4	22.4	16.4	16.4	18.4	16.4	25.4	12.4	15.4	8.4
Cuckoo heard	21.4	24.4	22.4	23.4	17.4	21.4	27.4	28.4	20.4	7.4
Corncrake	9.5	27.4	28.4	5.5	7.5	2.5	30.4	26.4	28.4	21.4
Lark singing	..	22.1	..	..	15.2	..	..	19.2	16.3	..
Thrush singing	..	25.1	..	20.1	..	16.1	12.2	5.2	6.3	18.1
Bumble bee	8.4	..	23.3	19.4	3.3	14.3	2.4	22.3	14.3	15.3
Queen wasp	14.4	..	11.4	16.4	2.5	6.4	29.4	2.4	21.3	22.3
Cabbage butterfly	17.4	21.4	14.4	5.5	3.5	27.4	24.4	27.4	28.3	8.4
Caltha palustris	9.4	..	..	..	..	..	..	..	..	..
Blackthorn in flower	22.4	9.4	21.4	..	10.4	1.4	13.5	12.4	2.5	12.3
Primrose, wild	..	28.1	24.1	9.2	3.3	11.2	8.3	21.2	16.3	21.1
Hawthorn in flower	..	1.5	..	..	4.6	7.5	15.6	22.5	27.5	..
Stitchwort, greater	26.4	9.4	21.4	..	..	..	..	1.5	..	..

QUERY AS TO BIRD.—The insectivorous bird a correspondent asks in our last the name of, is what is known in the neighbourhood as the "Bletherin Tammie" or stonechat.—*Adamson, Motherwell.*

PRESERVING BUTTERFLIES AND MOTHS.—Will some correspondent give me instructions in the use of a solution of corrosive sublimate in alcohol, for preserving butterflies and moths? I have prepared about a hundred of my moths, but am not satisfied with the result, the fringes of the wings and the feathers on the thorax invariably get matted. I make the solution too strong, and then dilute till there is no visible deposit left on a black feather after immersion. I dry the insects before the fire.—*Walter A. Pearce.*

MUD INHABITANTS.—While examining an infusion of green mud off the spout of a building, I observed a creature of reddish colour and transparent structure, which continually shot out its "mouth," which was fringed with small tentacles, and seized small grains. I could not tell whether they were animals or not. While feeding, it held on by the other end to some of the minute twigs in the water. It moved about much in the same way as an earth-worm, by shooting out one extremity and then drawing itself up after it. One extremity seemed to have two small horns like a snail. Will any of your more experienced readers be so kind as to tell me what it was, for which they shall receive my grateful thanks?—*R. M. W.*

HENS AND HORSE-HAIR.—It is an unfortunate fact that the lady whose experiences I forwarded to you under the above heading was the victim of a hoax. I did not hear of the imposture for more than two months after the letter was sent, and from your not having inserted it by that time concluded that you had perceived the absurdity and suppressed the problem. Seeing it six months after date is a disagreeable surprise. It will be proper to insert this, notwithstanding that human hoaxes possess less of scientific interest than their perpetrators seem to think.—*C. B. Moffat.*

GREEN FROGS.—If kept in a cool and dark place, these will require no food worth mentioning all the winter.—*E. A. F.*

HERONS.—In your March number, p. 69, I drew attention to Waterton's opinion about these birds' way of sitting on their nests. He maintained that it is impossible that they should sit astride, on anatomical and other grounds. However, a cousin of mine assures me that some years ago, on climbing to a nest in which a heron was sitting, he saw one of its legs sticking through the nest, and caught hold of it.—*E. A. F.*

SUPPOSED VIPER.—I notice in SCIENCE-GOSSIP that Mr. E. H. Robertson states that on July 17, 1882, he killed a common viper (*Pelius berus*) near a heap of manure, and on dissection found eighteen eggs. I think if Mr. Robertson before writing had looked into "Our Reptiles," by M. C. Cooke, or any other book on Reptiles, he would have seen his mistake. The snake he killed I have no doubt was the common snake (*Tropidonotus natrix*) and of no unusual size, she had gone to the dung heap to lay her eggs. The female viper produces her young alive. I have dissected many female vipers, and found the young in various stages.—*R. Y. Green.*

SUGGESTED "MARKET" FOR NATURAL HISTORY OBJECTS.—It occurs to me that, considering the great difficulty that exists in arranging satisfactorily the exchange of specimens of natural history, it might be much facilitated by the institution of a market for that purpose. London would be a good central place for it. At present the correspondence involved, the package necessary, and the expense of postage, greatly interfere with the progress of exchange. All this might be obviated by the use of a hall for that purpose. The opinions of your readers would be very acceptable.—*B. Piffard.*

HUNTING WASPS.—J. P. Smythe wishes to know if it is common for wasps to hunt their prey in the manner he describes. The wasp is a bold and rapacious insect; and although fond of fruit and sugar, it will not scruple to attack and devour flies, &c. I have frequently seen it pounce upon some poor fly and carry it off to a nook, and there make a hearty meal, or fly off to the nest with its victim as food for the larvæ. The wasp he observed did this with the grasshopper. It is very seldom that the wasp attacks flies or any insect on the window-pane. The simple reason, I think, is that to a certain extent it is a prisoner, and keeps running up and down the glass, being so intent upon gaining its freedom, that it disregards the flies.—*J. B.*, *Alton.*

WASPS AND FLIES.—I have often seen wasps pounce upon the common house flies, especially on a hot day, and have watched them as if in the act of mastication. I have also seen hornets pounce upon and kill our common brown honey bee, but whether their bodies are carried off to the nests, or they are only killed for the sake of their honey, I cannot say; they certainly take only the bees, and do not touch the humble bees or wasp flies; therefore every beekeeper should kill all the hornets he possibly can.—*R. T. Andrews.*

BRITISH BEES.—I think your numerous microscopical readers would find it worth while, in some of their leisure hours, to bestow a little of their attention on the bees of this country, of which I believe there are about 250 species, the hive-bee of course claiming first attention; and anything which they may be able to bring to light concerning it would be welcomed in the beekeeping world. Honey would also, I think, repay attention and investigation into the changes it passes through.—*A Lover of Bees.*

THE PROSPECT OF A SHARP WINTER FOR 1882.—There is every prospect of a sharp winter this year, if we believe the following signs. Fieldfares have appeared about here very early this year, being seen in abundance at the commencement of Sept. This is a sure sign of frost and snow, as it is supposed that it is commencing early at their summer homes, and so driving them further south. Is there anything in this tale? Holly berries and hips-and-haws are abundant: this is a foreboding of cold weather.—*W. P. Ellis, Enfield Chase.*

A TAME HAWK.—At the present time a patient of mine possesses a hawk which is perfectly tame and harmless, he allows any one to handle him with impunity, and strange to relate, if one places him on his back there he will remain till he is put on his legs again. Stranger to say, he lives most harmoniously with a green linnet which was originally put in his cage for a meal; when first incarcerated with his apparent enemy, he slunk into the furthest corner, no doubt expecting instant death, but perceiving that no danger was to be apprehended he approached the woodland tyrant, and very speedily both were on extremely friendly terms, and ever since if any one goes near the cage, the hawk will open one of his wings to shield his diminutive companion in captivity. At night-time the linnet invariably goes to sleep with his head snugly ensconced under the same protecting canopy. I myself have witnessed the above several times, and I think it should be noted as an interesting and unique ornithological fact, proving that the hawk *can* be domesticated; for I believe it is generally regarded as impossible that such a voracious bird could exist even for a short period under restraint. What makes it still more interesting is, that two birds of such opposite natures should live in such perfect amity. At first he was a great enemy to the cats, for if they came too near he would at once open his beak, expand his wings, and rush at them most furiously, uttering at the same time a low sibilant hiss.—*E. Marlett Boddy, F.R.C.S.*

"RECENT CAPTURES" (SCIENCE-GOSSIP, p. 261).—Before Mr. A. R. Graham writes about "wholesale extermination of our rare visitors," I think he should learn a little more of entomology; perhaps he would then discover that rare bees, like diamonds, are not confined to one particular spot only. Both are always to be found by any one understanding such things, and who knows where and how to look for them; but if left to those gentle "lovers of Nature," I fear very little would be known of their history. A true entomologist would never impound every specimen he could see, much less do anything to exterminate such a rarity as *Macropis labiata*, and of which Mr. F. Enock left plenty of males and females to "be fruitful and multiply."—*Ferndale, Woking Station.*

THE DANCING OF GNATS.—May I ask the opinion of your readers as to their views on that which seems to me a curious phenomenon, namely the periodical meeting of gnats, midges, and a few other species at certain spots for the purpose of holding their eccentric games. We know the *object* of these gatherings; but how is it that the same localities are always chosen not only night after night, but year after year, by these tiny revellers, and what sort of invitation is it that draws them so? For example, on a hot evening I have seen a column of gnats hanging over a tree in a forest so vast that they looked like the ascending smoke of a camp-fire, and so numerous that the hum of their myriad tiny wings could be heard at thirty yards like the distant sound of the sea. Night after night they came there when the sun set, and the same phenomenon can be seen almost anywhere. I do not believe that either food, shelter or breeding grounds have anything to do with the habit, which in my opinion is one of simple reason. Is this too much for your readers to concede to this tiny folk?—*E. L. A.*

WHITE VARIETIES.—The "Westbury House School Ephemeris" contains the following list of white varieties of various flowers found at Worthing during June:—1. *Trifolium incarnatum album*, found on the way to Cissbury, var.; 2. *Myosotis arvensis alba*, same locality, but only a single plant; 3. *Polygala vulgaris alba*, common at Cissbury; 4. *Lychnis flos-cuculi alba*, Lancing Marches, p.; 5. *Orchis maculata alba*, Lancing Marches; 6. *Cardamine pratensis alba*, Lancing Marches. The following were found last year:—7. *Campanula rotundifolia*, Downs, r.; 8. *Erica tetralix alba*, Downs, r.; 9. *Scabiosa arvensis alba*, Downs, r.; 10. *S. succisa alba*, Downs, c.; 11. *S. columbaria alba*, Downs, c.; 12. *Viola odorata alba*, c.; 13. *Thymus serpyllum album*, Downs, r.; 14. *Scilla nutans alba*, Goring, p.

THREE-TOED SLOTH.—Would some reader supply me, through the medium of your valuable journal, with a list of books or papers referring to the three-toed sloth?—*Alex. Macindoe.*

CANADA GOOSE.—On November 6 my father shot a large goose in a ploughed field at Shepherdswell, between Dover and Canterbury; it allowed us to approach within forty or fifty yards before it rose. It weighed $9\frac{1}{4}$ lbs., and measured five feet across the wings and three feet from bill to tail. I found it corresponded to the coloured plate and following description of the Canada Goose:—"This species is shaped nearly like the common tame goose, but is somewhat longer; the bill is of a black or deep lead colour; the eyes are dark; the head and neck are black, except a white mark on the under-side of the former, which becomes narrower on the sides, and terminates in points about the place of the ears; the back, wings and part of the breast and belly, are of a dark-brown hue, the edges of the feathers inclining to ash colour; and the primaries are almost black. The lower part of the back and rump is black; the upper coverts of the tail are white; and the tail feathers are black. The forepart of the breast, the lower belly, and the covert feathers beneath the tail are white; and the legs and feet are of a dark lead colour." Can anyone inform me of its habits; whether it is often found in this country, and where this specimen probably came from?—*J. Jacob.*

CURIOUS CONDUCT OF A DOG.—I shall reply to Mr. Goddie's comments (p. 263) as briefly as possible. Actions resulting from association of ideas do not exhibit any of the ingenuity or adaptation of means to ends which characterises actions resulting from or guided by reason. As an illustration of the former class, I may cite the well-known case of the dog who carried a penny in his mouth, marched to a baker's shop, dropped the money on the counter, grasped in his mouth the roll given in exchange, and returned triumphantly to his master. Here we have no evidence to suppose that the animal understood the principles of contract, or the value of coin, as a means towards an end; his whole conduct clearly resulted from association of ideas, and also imitation. Mr. Goddie is quite right in controverting the sweeping assertion he alludes to. It is quite true that animals think mostly by the power (which man also possesses) of considering absent objects by means of signs, and also by association of ideas. But the power to interpret written or printed characters does not involve an effort of reason on the part of man or of any lower animal. It cannot be denied that the various calls, cries, etc., which animals use possess a certain amount of expression, i.e., they serve to express emotions or feelings, and perhaps also certain ideas, which are instinctively understood by their fellow-creatures. But there is no evidence whatever to prove that the lower animals are endowed with what is undoubtedly the chief function of language, viz. as an aid to and register of the important processes of abstraction and generalisation. It has never yet been demonstrated that any action of any of the lower animals can be attributed to or directed by an abstract notion (such as roundness, sourness), or to a general notion (such as man, round, etc.); but there can be no doubt that the memory or association of the concrete does, by virtue of the symbolic power already alluded to, very considerably influence and direct the conduct of such creatures as the dog, etc.—*P. Q. Keegan, LL.D.*

PRESERVING LARVÆ OF LEPIDOPTERA.—Can any reader of SCIENCE-GOSSIP inform me the best way to procure dried specimens of the above? I have a few autumn larvæ in spirits of wine at present. How should I proceed now?—*C. S.*

LOCAL NAMES.—In September last (Notes and Queries), P. S. Taylor mentions "oaf" as the Suffolk for finch. A Norfolk friend tells me that in his parts these birds are called "ulf," or to preserve the analogy with the other county in spelling "oalf." Is "oaf" a degenerated form of "oalf," or has P. S. Taylor failed to catch the liquid when hearing the word spoken? In Norfolk, greenfinch = "greenoalf;" bullfinch = "bulloalf," etc. I observe that in the botanical saloon of the New Natural History Museum small charts, exhibiting the past and present distribution of the natural orders, are being prepared. Would not the publication of these, in "sheet" or "book" form, be a boon to those who stand to botany in the same relation as "zoographers" do to zoology?—*Ernest G. Harmer.*

WHAT BIRD?—In the September number, p. 207, E. H. R. asks the name of a bird "nearly twice the size of the house sparrow," and from his description, I believe it is the nuthatch (*Sitta Europæa*); but if so, he is mistaken as to the size. The nuthatch is rather shorter than the sparrow. And again in the October number, p. 238, he describes what appears to be the spotted flycatcher (*Muscicapa grisola*).—*H. L.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We receive so many queries which do not bear the writers' names that we are forced to adhere to our rule of not noticing them.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

R. C.—"Our Common British Fossils" has been unavoidably delayed in publication, but will appear shortly, perhaps by March. Dr. Traquair's Monograph on the Carboniferous Fishes is the best of the kind on that subject.

J. W. GREGORY.—Lindley & Hutton's "Fossil Flora of Great Britain," in 3 vols., gives illustrations of the fossil plant of the Primary and Secondary rocks as known a quarter of a century ago. The different volumes of the Palæontographical Society's publications contain figures and descriptions of many new species of Tertiary and other fossil plants.

W. SMITH.—The objects you enclosed are galls, commonly called "oak spangles." They are formed by an insect called *Neuroterus lenticularis.*

F. H. STREATFIELD.—Your small bottle contained the eggs of some mollusc, probably *Limnæa*, and the larva of a species of dragon-fly.

W. J. SIMMONS (Calcutta).—Thanks for your notes. Get, if you can, Mr. G. Newport's "Monograph of the Class Myriopoda," or "Transactions of the Linnean Society," vol. xix., p. 265, or the "List of Myriopoda in the British Museum;" M. Gervais' "Études pour servir à l'Histoire Naturelle des Myripodes," published in the "Annales des Sciences Naturelles," tome vii., 1837, would also help you.

H. L. (Maidstone).—We believe it to be the true type of *Mentha aquatica*, Linn., and not any of the described forms of Sole's species.

T. J. N. (Bawtry).—It is the hedge-maple (*Acer pseudo-platanus*), very rare in fruit.

W. B. (London).—You send too many species, except we devoted an entire page for the names. They are all named correctly, except it be *Hypnum incurvatum*, *Webera nutans*, and *Hypnum sylvaticum*. Examine again the leaves of the above species and let us know the result.

J. H. D. (Lisburn).—It is one of the cup-lichens, but too minute to ascertain correctly; it is not uncommon on other plants in damp wet seasons.

E. G.—The ferns are: 1, Todea; 2, *Polystichum acutum*; 3, *Polypodium serratum.*

MISS B.—We are sorry we cannot name your sea-weeds with any satisfaction, as they are all without fruits.

T. H. H.—We have no doubt you would procure "The American Naturalist," "Oologist," and other American scientific serials at Trübner's, Ludgate Hill. The price of each number of the former is 35 cents.

W. PATERSON.—Write to Mr. J. H. Kendal, F.G.S., Cockermouth, Cumberland, for information on both questions.

EXCHANGES.

EXCELLENT microscope, with accessories in box, with twelve interesting slides, for medical coil or other electrical apparatus.—Offers requested by C. Wheawill, Marsh, Huddersfield.

WANTED, birds' eggs, side-blown, of many species, to fill up gaps in collection. Good exchange in botanical or entomological specimens, or micro slides.—E. D. Marquand, Hea, Madron, Penzance.

WANTED, parasites (internal and external), mounted or unmounted, in exchange for Anatomical, Pathological, Diatoms, &c.—F. L. Carter, 20 Trafalgar Street, Newcastle-on-Tyne.

WANTED, correspondents in all parts of the world to exchange micro material.—F. L. Carter, 20 Trafalgar Street, Newcastle-on-Tyne.

NORTH-AMERICAN Lepidoptera in exchange for European and exotic living cocoons of Io, Luna, Polyphemus, Cecropia, and Promethia, for Selene, Atlas, and other species.—Robert Bartholomew, 749 North 26th Street, Philadelphia, U.S.A.

HUNDREDS of good seal impressions, mostly ancient, offered in exchange for others, or curiosities of almost any kind.—W. H. Tunley, 8 Albert Road, Southsea.

WANTED, British or foreign butterflies and beetles in exchange for British and foreign sea-weeds, plants, mosses, minerals, and fossils. Foreign correspondents much wanted.—B. B. Scott, 1 Smollet Street, Kensington, Liverpool.

WANTED, foreign toads, frogs, and other amphibia, in spirits or skin; exchange rare birds' and animals' skins, insects, &c.—G. E. Mason, 6 Park Lane, Piccadilly, London.

BRITISH Polyzoa, named, to be given away.—Apply during the month of December to Miss Jelly, Springfield, Reigate.

SIX to seven hundred British wild plants, many very rare, named and localised, in exchange for British or foreign shells, or cash.—B., 136 Ashmore Road, St. Peter's Park, London, W.

WANTED, offers of any odd parts of "The Annals and Magazine of Natural History," micro slides of palates; British land and freshwater shells, or books, in exchange.—J. Darker-Butterell, 2 St. John Street, Beverley.

WANTED, living specimens of British nudibranchs or south-coast anemones and madrepores; exchange as above.—J. Darker-Butterell, 2 St. John Street, Beverley.

EXOTIC butterflies: wanted, names of collectors wishing to exchange duplicates. To microscopists: wings of *Morphos*, *Uranias* and other brilliant exotics. Newspapers: wanted, names of persons taking the "Entomologist," "Entomologists' Monthly Magazine," "Exchange and Mart," "Graphic," "Illustrated News," and "Pictorial World," with a view to the exchange of papers.—J. C. Hudson, Railway Terrace, Cross Lane, Manchester.

DUPLICATES: *Cyclas cornea*, *Bithynia*, *Neritina*, *Limnea fragilis*, *Planorbis corneus*, *vortex* and *marginatus*, *Helix virgata*, and variety maritimus; *ericetorum*, *rotundata*, *Zonites alliarius*, *Bulimus acutus*, *Ceratisolen legumen*.—W. Gain, Tuxford, Newark.

FUNGUS on grass (*Epichloe typhena*) for any other unmounted fungi.—T. H. Swallow, 25 Market Street, Newcastle-on-Tyne.

FOR exchange, a quantity of microscopic slides, material, &c.—F. S. Lydaon, 2 Oakland Villa, Redland, Bristol.

FOR exchange, large stock of microscope slides: vegetable sections, dissections, and many sphagnum leaves, stained and true to name, all mounted in Canada balsam, and good workmanship. Wanted, British wild plants: chief local ones, also northern ones, and British Longicorns. The slides will be sent on approval.—B. Piffard, Hill House, Hemel Hempsted, Herts.

A BEAUTIFUL copy of the "Imperial Lexicon," 2 vols., half calf, and Albert von Kampen's Fifteen Maps illustrating "Cæsar's Gallic War" (new) in exchange for fossils, micro slides or shells, or in part payment for a good mineral and fossil cabinet.—Rev. J. Finnemore, Broomfield Place, Witton, Blackburn.

WILL exchange the following stuffed birds and skins for books or anything useful:—Stuffed heron, turtle-dove, partridge, greenfinch, golden-crested wren, and cock pheasant. Skins: wood-pigeon, great black-backed gull, silver pheasant, kestrel, barn owl, linnet, blackbird (variety with white feathers), land-rail, swift, and golden hen pheasant.—Alfred Baker, Tewkesbury.

WANTED, in quantities, foreign birds' eggs, well-blown and correctly named, either for cash or exchange.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

WANTED, fossils from chalk or corals (either rough or polished) from carboniferous limestone, Clifton, in exchange for trilobites and corals from Silurian. Offers.—H. L., 197 Deritend, Birmingham.

THE following starches, unmounted, for a good well-mounted micro slide (ground glass). Arrowroots collected by the late Dr. Letheby: Maranta, St. Kitt's, St. Vincent, East India (*Curcuma angustifolia*), Bermuda, Jamaica, Tahiti, Portland, Brazil.—M. D., 2 Westbury Gardens, Clapham Park, S.W.

WANTED, living specimens of *Trichomanes radicans*, *Pteris serrulata*, *Pteris cretica*, *Platycerium alicorne*, *Lomaria gibba*. Microscopic slides offered in exchange.—J. C. H., 8 Lansdowne Crescent, Glasgow.

MACHAON, Edusa, Comma, for exchange. Desiderata: Hyale, Sinapis, Cassiope, Aglaia, Athalia, Adonis, Ægon, Actæon.—A. S. Jones, Trumpington House, Cambridge.

FOR exchange Abbe's binocular, by Zeiss, new. Wanted, Ralfs' Desmidica, or good unicellular algæ or diatom slides.—G. Clifford, 2 Rue Scribe, Paris.

WANTED, botanical books, especially fern books.—E. G., Masham Vicarage, Yorkshire.

WANTED, SCIENCE-GOSSIP for 1875, unbound, clean copy.—D. Adamson, Watson Street, Motherwell, N.B.

A GREAT number of rare and well-set British lepidoptera for eggs in clutches, owls, hawks, sandpipers, stints, and terns especially wanted; have also last two vols. of SCIENCE-GOSSIP.—Thomas H. Hedworth, Dunston, Gateshead.

DUPLICATES: Paphia, Sinapis, Alsus, Adippe, Selene, Polychlorus, and Linea. Desiderata: Edusa, Cardamines, Galathea, Semele, Thecla, Corydon, and Sibylla.—F. A. Skuse, 143 Stepney Green, London, E.

OFFERED, L.C., 7th ed., 11, 177, 184, 196, 365b, 495, 497, 579, 588, 595, 626, 739, 831, 841, 901, 906, 923, 1012b, 1039, 1141, 1142, 1151, 1151b, 1240, 1287, 1358, 1395, 1416, 1431, 1447, 1458, 1470, 1499, 1504, 1519, 1565, and many others. Send complete lists of duplicates and desiderata to F. C. King, 1 Tulketh Crescent, Ashton-on-Ribble, Lancashire.

FOR seeds of *Datura stramonium*, send stamped envelope to F. C. King, 1 Tulketh Crescent, Ashton-on-Ribble, Lancashire.

DUPLICATE eggs from a collection of about 600 varieties, including British, American, and Indian, to exchange for others, either British or foreign. Correspondence invited.—George A. Widdas, Woodley View, Leeds.

WANTED, Loudon's "Encyclopædia of Plants" and Decaisne and Le Maout's "General System of Botany;" must be recent editions, and in good condition. Reply, stating price, to J. Boyd, Deans Bridge, Armagh, Ireland.

EGGS of black-headed gull, dunlin, oystercatcher, grey wagtail, dipper, pied flycatcher, common sandpiper, redshank, and common tern, for other one-holed specimens. Unaccepted offers not answered.—W. Edgar, Warwick Road, Carlisle, Cumberland.

LARGE cylinder, electric machine, and microscope, for sale or exchange.—H. W. Wager, Middle Street, Stroud, Gloucester.

WANTED, human pathological slides; state what required.—G. F. H., 4 Richmond Road, Barnsbury, London, N.

WANTED, correspondents in the colonies (not dealers) to exchange specimens of natural history, especially lepidoptera.—A. H. Shepherd, 4 Cathcart Street, Kentish Town, London, England.

LOND. CAT., 3b, 4a, 7, 10, 24b, 80, 130c, 187, 209, 233, 258, 260, 280, 532, 568, 587, 625, 634, 809, 865, 901, 1041, 1259, 1342b, 1422, 1501, 1597, 1613. *Potamogeton Zizzii*, *Potentilla Norvegica*, &c., for other rare British plants. Lists exchanged.—P. F. Lee, West Park Villas, Dewsbury, Yorkshire.

BRITISH mosses and phanerogams offered for British or foreign shells, especially marine.—W. West, 15 Horton Lane, Bradford.

WANTED, mounted and unmounted anatomical and pathological sections, also botanical stained sections, and all kinds of unmounted material; exchange first-class slides.—F. R. Martin, Clevedon.

WANTED, specimens of Crustaceæ; will exchange for Lias fossils.—J. Bennison, Golden Lion Bank, Whitby, Yorks.

BOOKS, ETC., RECEIVED.

"Chapters in Evolution." By Dr. Anten Wilson. London: Chatto and Windus.

"Diseases of Memory." By Th. Ribot. London: Kegan Paul and Co.

"Winners in Life's Race." By A. B. Buckley. London: E. Stanford.

"Studies in Microscopical Science." Edited by A. C. Cole. Nos. 21, 22, 23, 24, 25.

"Land and Water."
"The Field Naturalist."
"Natural History Notes."
"The Naturalists' Monthly."
"Midland Naturalist."
"Northern Microscopist."
"Ben Brierley's Journal."
"American Naturalist."
"Botanical Gazette."
"Canadian Entomologist."
"Cosmos: les Mondes."
"La Feuille des Jeunes Naturalistes."
"Le Monde de la Science."
"La Science pour Tous."
"Ciel et Terre."
"Revista."
&c. &c. &c.

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